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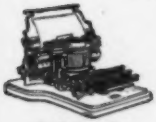

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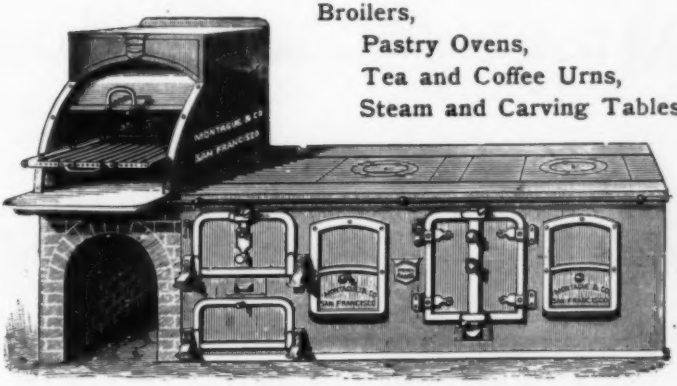

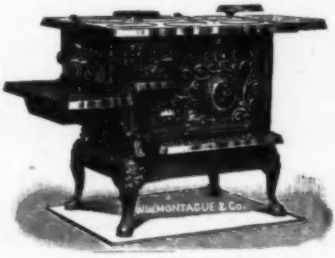

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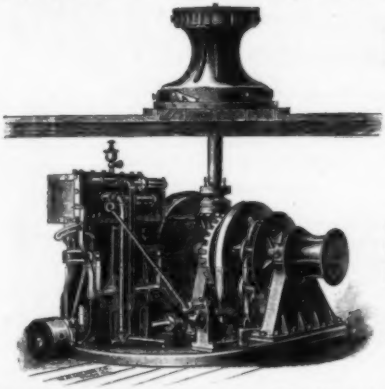

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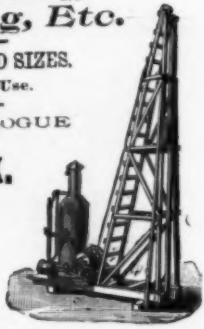

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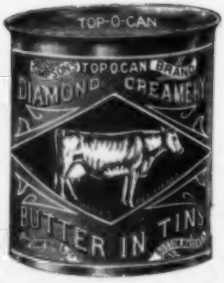

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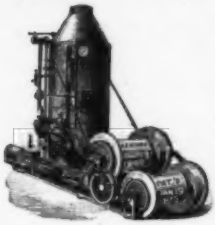

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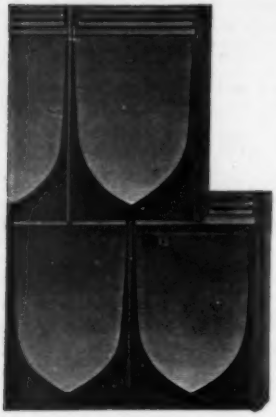

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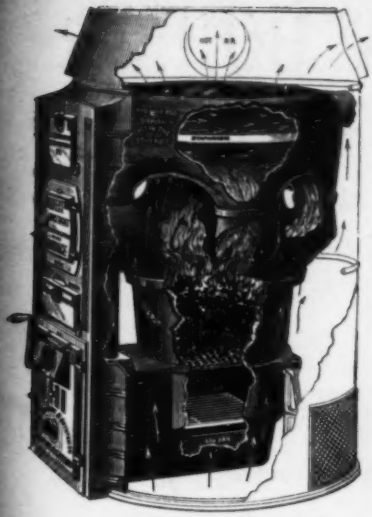

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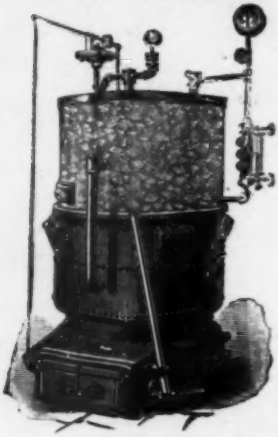

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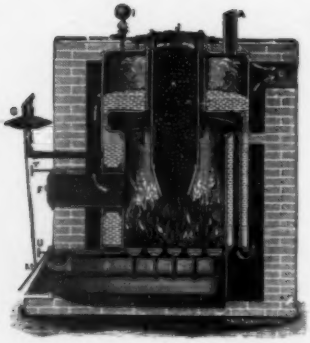

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JOURNAL

OF

THE MILITARY SERVICE INSTITUTION

OF THE

UNITED STATES.

"I cannot help plead to my countrymen, at every opportunity, to cherish all that is manly and noble in the military profession, because Peace is enervating and no man is wise enough to foretell when soldiers may be in demand again."—SHERMAN.

VOL. XIV. MARCH, 1893. NO. LXII.

Prize Essay.

"THE ARMY ORGANIZATION, BEST ADAPTED TO A REPUBLICAN FORM OF GOVERNMENT, WHICH WILL ENSURE AN EFFECTIVE FORCE."

BY LIEUT. SIDNEY E. STUART, ORDNANCE DEPT. U. S. A.

"A free people ought not only to be armed, but disciplined, to which end a uniform and well digested plan is required."—WASHINGTON.

THE subject represented by the title selected for this essay is of special importance in the United States in the present state of military matters, and its selection by the Council of the Institution as the subject of its prize essay is particularly well timed. We are now at a turning point in the stage of affairs in respect to three most important conditions of army organization, conditions that go to the very foundation of its efficiency and success. Our regimental organization has been rendered obsolete by the advance in the art of war and demands a new form to suit it to the battle conditions of the future. Up to recent times our army has, in its peace organization, always been almost entirely employed in guarding our frontier settlements from the attacks of unsubdued hostile Indians, but this occupation is already dying out and will soon disappear and allow the army to assume undisturbed the discharge of its functions as a conservator of mili-

tary science and knowledge, and a nucleus for the formation of the volunteer armies on which we must ever depend for the assertion and defense of our rights; and our legacy from the Civil War, that great reserve of officers and men possessed of war experience, which has since then rendered an organized reserve unnecessary to the rapid expansion of our armies at the outbreak of war, is fast passing away, so that it now becomes necessary to adopt some systematic means for the replacement of this legacy by the formation of a suitable reserve for the expansion of our small regular army. Never before in our history have so many favorable conditions been combined, and re-organization has, in consequence, become the cry of the day among military men and is beginning to be recognized as necessary by the public and its representatives in Congress. The question of what form of army organization is most suitable should then be in the mind of every military man and its discussion of more than usual interest and importance at this juncture of affairs.

In such a discussion the term "army organization" should not be limited to the organization for tactical and administrative purposes merely, but should properly be given a much broader scope and held to include also the organization for the recruitment and supply of men both in peace and in war, and that for training, mobilization and expansion, in short, the entire military system, for it is by these latter branches that its strength and efficiency are mainly assured.

The two conditions imposed by the title of this essay, and which must govern the discussion of the subject, are that the force shall be effective and the organization best adapted to a representative form of government. It will therefore be proper to consider first the conditions or elements of effectiveness and of adaptability to a republican form of government, remarking that, as the essence of a republican form of government is its quality of being representative, so the conditions of adaptability to it apply to all governments in proportion as they are representative in actual character, to England, for example, nearly or quite as much as to the United States, and even more than to France, which, though republican in form, is monarchical in tradition and tone.

This condition of adaptability to the form of government has but little effect on the degree of effectiveness necessary to be provided for, which is determined by the external relations of the

nation rather than by its internal condition; indeed these external relations, or the degree of efficiency imposed by them, may constitute conditions of such overwhelming magnitude and importance as completely to mask or override those pertaining to a republican form of government, so that these latter may be scarcely apparent in the result. Thus, republican France is induced by her external relations to maintain the same immense military force as her monarchical neighbors, and her measures to that end are scarcely at all affected by her form of government. Many other conditions also affect the efficiency, and also the adaptability of any form of organization to the end in view, as, for example, character of inhabitants, geographical and topographical character of the country, density of population, ratio of the army to the whole population, etc., etc., and any proper consideration of the subject in its application to a particular case must include all these conditions in its purview or be to a certain extent defective.

But there are certain general conditions which pertain to a republican form of government and which will have more or less influence in the selection of an organization and may, under some conditions, even constitute the principal factors for the determination of the particular form to be adopted. One of these is that a more certain reliance may be placed in the patriotism of the people of a republican government and their willingness to make sacrifices in the support of war than in those of an autocratic one. Under the latter form war can be made against the wishes of the population, but under the former no war can be made which is unpopular, at least with the majority of the people. The Executive is never forced to rely wholly on the standing army but can always count on being able to form armies from amongst the people. This statement may at first view seem to be hardly justifiable in view of the unpopularity in the North of the Mexican War and in the New England States of the War of 1812; but the still greater unpopularity in England of this latter war and that of the Revolution, so great even as to cause her to retire from the contest with diminished glory and material disadvantage, serves to more than offset these cases and sustain the correctness of the assertion.

Closely associated with this, and resting on the same foundation,—the exclusiveness of the right of the people to declare war,—is the somewhat sentimental, but for that none the less—perhaps all the more—real and powerful condition of the appropriateness of entrusting the military power of the country to the people them-

tary science and knowledge, and a nucleus for the formation of the volunteer armies on which we must ever depend for the assertion and defense of our rights; and our legacy from the Civil War, that great reserve of officers and men possessed of war experience, which has since then rendered an organized reserve unnecessary to the rapid expansion of our armies at the outbreak of war, is fast passing away, so that it now becomes necessary to adopt some systematic means for the replacement of this legacy by the formation of a suitable reserve for the expansion of our small regular army. Never before in our history have so many favorable conditions been combined, and re-organization has, in consequence, become the cry of the day among military men and is beginning to be recognized as necessary by the public and its representatives in Congress. The question of what form of army organization is most suitable should then be in the mind of every military man and its discussion of more than usual interest and importance at this juncture of affairs.

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selves, to an army of the people, of the thinking portion of the people, who take up arms as a matter of public duty and responsibility, not from mere national pride or desire for martial glory and renown. Under the republican form all the other duties of the government are entrusted to the people and the agents of their performance come from their midst and reflect closely their ideas and interests. It is with a certain fitness that the army should share the general lot and should be an army of the people, as the legislative power is a legislature of the people, and the executive and judicial officers, citizens selected by the people from among themselves. A standing army composed of soldiers having little interest in their work other than that aroused by their pay, a simply hired army, is entirely foreign to the character of a republican form of government. This same idea of fitness of things would similarly demand that the service should, if practicable, be obtained by voluntary enlistment and not by conscription, which is a most objectionable method to a free people and to be avoided whenever possible. It would be better to tax all and raise the pay to such a point as to secure voluntarily all the soldiers needed, than to force an indiscriminating conscription.

Another condition of prime importance is that the organization must command popular approval. An autocratic government may declare universal service and enforce it in such degree and form as it pleases, but a republican one can only impose such liability to service as the people may consider necessary, just and reasonable, and must also choose its form of army organization to suit the same democratic sovereignty. They hold the powers of creation and support and must be satisfied of the necessity for an organization and with the suitableness of its form in order that it may be created or continue to exist.

Assuming the popular appreciation of the necessity for an effective force, the principal remaining elements which go to secure popular approval are popularity and cheapness. This latter is a very important quality. The objection to a standing army nowadays is first of all its cost. This, while an obstacle to an autocratic government, is more especially so to a republican form, wherein the purse-strings are held by the people or by those who are closely representative of them, and except in the most obvious danger it is rarely that the people can be made to recognize the necessity for so large an army as those who are responsible for the organization of the country's offensive and defensive powers deem

to be proper and even indispensable. This objection therefore demands reduction to its lowest practicable limits by the adoption of a form of organization that will produce the maximum ratio of efficiency to cost.

But popularity in the ordinary meaning of the term,—the possession of the good will and liking, the occupancy of the good graces of the people,—is an even more important consideration than cheapness, and possibly than external circumstances, in enabling the government to maintain an effective force. The elements of popularity, the promotion of patriotic enthusiasm and national pride, the opportunity of witnessing and sharing in military pomp and show, lie close to and minister to the enjoyment of the people, and may easily be more potent arguments to large expenditures or other sacrifices than the more remote and abstract idea of possible, but more or less distant danger.

The condition that the organization must insure an "effective" force is rather indefinite, and perhaps no two authorities would agree on the degree of effectiveness necessary to entitle a force to qualification by this term. Much depends on the condition under which it is to be employed, and it will consequently be necessary to consider what may be the character of the probable and possible occasions for the use of our army, for it is by these conditions that its effectiveness must be tested. But it will be proper to consider first what are the elements of effectiveness and what means are adapted to their production; remarking by the way that the two conditions of effectiveness and adaptability to the form of government react on each other so as to be not wholly separable, the latter conducing to the former, and effectiveness tending to adapt the organization which produces it to any form of government.

The effectiveness or efficiency of a military force may be considered as resulting from three elements—numerical strength, training, and discipline. Training is the instruction of the soldier in the nature and performance of his functions; discipline the spirit that, pervading an organization, bends all wills into subjection to that of the commander, and consequently into coördination with each other. Training is carried out by drills in the exercise of the drill regulations, target practice, and practice in field exercises and camp life. Discipline may be defined as a condition in which each man possesses that mental attitude wherein he recognizes and accepts the limitations of his position, subjects his

will to that of those in positions superior to his, and restrains himself to the proper performance of his own functions, trusting that others will do the same, and knowing that they repose a like trust in him; it is the result partly of habit and partly of self-control, exerted in consequence of the recognition of its necessity. The principal conditions conducive to discipline that are available in time of peace are:—living in an atmosphere of discipline, such as is found in the regular army, by which the soldier absorbs discipline without effort or question as a natural element of his relations to those about him; drilling in the exercises of the drill regulations, the primary object of which is training, but which is scarcely less important for its disciplinary effect in habituating soldiers to obedience to orders, instructing them in the limits and functions of their position, and accustoming the members of an organization to perform each his own part and rely on others to do the same,—to "work together," as the expression is; and the mental recognition of the propriety of, and necessity for the self-control of discipline, arising either from the fear of punishment or an intelligent appreciation of its propriety and importance.

The last condition is a function of the character of the recruits and depends largely on the national character of the people; its effect may be enhanced by a wise system of recruiting and organization, such as to make the service attractive, by means of which a superior class of recruits may be obtained. The first and second conditions are purely functions of, and are to be provided by, the organization.

The first condition is to be attained to mainly by a high degree of discipline and efficiency among the officers, from them extending to the men. It of itself constitutes a powerful argument for the highest training and most careful selection of officers, and against the method by election so commonly practiced by volunteer organizations, which, if ever compatible with good discipline, is so only in special cases where the last condition mentioned above is made peculiarly effective by the high character of the soldiers. The second condition has a powerful effect on discipline in addition to its direct effect in training the soldier. How much drill would be necessary to make the average recruit sufficiently familiar with the drill for effective active service is a question that admits of comparatively definite determination, and authorities will not differ widely upon it, but how

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much is necessary to produce, in conjunction with the other conditions, an adequate degree of discipline, is a much more difficult question to decide. However, in the cases that we shall take up for discussion, other causes will always appear to reduce the amount of time available for drill below the limit of usefulness in this respect.

Whether the proper standard of efficiency for the purpose of this article can be attained by giving to its acquirement only such time as can be obtained without seriously interfering with civil pursuits—whether this condition demands that the force shall be regulars or may be organized on the principle of intermittent service, like the national guard—is of the greatest importance; and in this connection it is to be remembered that effectiveness of the whole body is a function of numbers as well as quality, and although we may concede that the quality of this latter class will in the general case be lower than that of regulars, this deficiency may be more than covered by the increase of effectiveness due to the greater numbers of this class that it may be practicable to obtain under the conditions existing in this country.

I think that we may assume that this last consideration is of such effect that, assuming that the officers be thoroughly trained and efficient, we may, if necessary to the employment of the national guard principle for the men, allow proficiency in the more essential manœuvres of the schools of the company and battalion in close and open order, together with such a fair degree of familiarity with and skill in the use of their arms as may be acquired by a moderate amount of target practice, and a little practice in field exercises and experience of camp life, to constitute a sufficient evidence of the requisite training and discipline for effective service. Such troops would undoubtedly be capable of much improvement by a period of constant service in the regular army, and of more by a "baptism of fire," but may be said to be sufficiently well instructed and disciplined to be ready for and capable of profiting by the "baptism" when subjected to it. While not really good troops as compared with veterans, they would be usable troops and would ripen rapidly in use. We will now consider what will be the probable occasions for the use of an army and what forces it should be prepared to meet.

In looking at this subject from the point of view of ethics or justifiableness it is difficult to conceive it possible in this much lauded *fin de siècle* period that war should ever again come to us.

It is undoubtedly infinitely more sensible as well as more in accord with our obligations to God and man, that all our quarrels should be settled by arbitration, and it seems to many that this course is already practicable and war a relic of a barbarism now outgrown. But when we approach it from the standpoint of, not what might be, or what ought to be, but of what is, we find that civilization has not advanced to the point of making arbitration universal and war obsolete, and that a nation's only safety against imposition lies in being able to enforce and defend its rights by might. Living and irrefutable evidence of this fact is found in the attitude and armaments of the principal European powers to-day, and no one is bold enough to assert that they will not yet result in actual war, or that, under the existing circumstances, the armament of each State is not necessary to its safety. The world has not yet advanced to the point where war has ceased to be a possible eventuality or means of settling the disputes of nations. Whether our own country has done so it is not necessary for us to discuss; it is largely controlled in this respect by the state of others, and it may be safely asserted that hostilities on the part of any other nation would be met by us with armed resistance, not with appeals for arbitration.

We undoubtedly have a heavy bond for peace from every important European power in its present situation—from England in the vulnerability of her immense commerce and food supply, and from the continental nations in the nice balance of power and the hostile relations now existing among them—and this fact will act as a stronger argument for resort to arbitration than any sentiment against war. But while we have heretofore been quite content with the policy of staying at home and confining our efforts to the development of our domestic resources, we are now beginning to reach out in a commercial way and will soon be actively seeking entrance to fields which have hitherto been exclusively occupied by Europeans, with consequent endless occasions for disputes and the creation of bad blood; so that our opportunities for quarrels with other nations will grow greater and greater. Then also the policy of the Monroe Doctrine will quite likely, in the future as it has in the past, put us in the position of saying to the strongest foreign powers, Hands off! It is therefore practically certain that serious collisions of national policies and interests will occur between us and some of the powerful centralized governments of Europe, and in such event it cannot

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be doubted that they will employ any and whatever means, from argument to threats, or even seizure of the interests in question in simple disregard of our claims, that may seem to them most available for the accomplishment of their object. Nations are proverbially conscienceless and apt to measure right by might, and to be to some extent prepared to assert and defend our rights is but a necessary step to putting ourselves on a footing from which even to conduct negotiations with some prospect of being accorded a respectful and considerate hearing. This alone is a good argument for the maintenance of a fairly efficient defense such as shall make bluster and threats obviously useless and render a resort to argument and arbitration the only available course in cases not so serious as to demand the arbitrament of war. As to England in particular, our affinities with her are, it is true, closer than with any other nation, but so are our rivalries greater, and in the very closeness of our relations resides danger as well as safety, for it furnishes greater opportunities for disputes as well as greater reasons for arbitration; and as she is an aggressive nation that, notably among nations, measures her rights by her opponent's weakness, it behooves us to be not entirely unprepared to meet possible encroachments with force.

The points in which we are vulnerable to a powerful nation are along our coasts and on our northern frontier. The creation of a coast defense has been entered upon and the expenditure of large sums of money therefor authorized by Congress, which has also granted money for the establishment of some large posts on the northern frontier, intended for the occupancy of the troops being released from the necessity of service in the West. From this it would appear that the policy of Congress is to provide especially for an efficient coast defense and also to make such provision as may be made without great outlay for the defense of this frontier. The military authorities are in duty bound by the intent of Congress in this matter, and we may therefore conclude that the object of our army organization should be to provide primarily for a defense of our coasts and secondarily of our northern frontier, and incidentally, we may add, for such general development of our military strength as may be practicable without any notable increase of expense therefor; and the form of the organization should correspond thereto.

An attack on our coasts will be met by fortifications so far as the principal ports are concerned, but such fortifications and the

cities defended by them are liable to a land attack, and would need to be supported by an army sufficiently strong to oppose any force that could be landed on a bare shore or in the smaller harbors with a view to turning the fortifications and attacking from the rear these cities, which would be the most valuable prizes and also necessary as bases for any subsequent operations. What would be necessary to repel attack by a fleet has already been well considered and the plan of fortification pretty definitely adopted. The strength and organization of the heavy artillery may be determined from the single condition of providing for the service of the fortifications constructed in pursuance of this plan; those of the field branches of the line will be dependent on the land forces that they may be expected to meet.

It would be hard to predict how large a force could be brought to our shores from across the Atlantic. The difficulties of transportation would practically set the limits in this respect, and they would also constitute the limitation on the rate of concentration of English troops for an attack from Canada. As England commands a greater transport service than any other nation we shall, in providing against her attack, provide against all. The *Army and Navy Gazette* published in 1887 a list of 79 vessels subsidized for use in war, capable of steaming at 14 knots or over, and having an aggregate tonnage of 350,000, and this number could without doubt be largely increased in case of real need. For the expedition to Egypt in 1882, the distance being 3000 miles, the same as from England to the United States, England transported 15,600 infantry, 2300 cavalry and 6 field batteries fully horsed and manned, with headquarters, in vessels having an aggregate tonnage of 90,000; the average being 2½ tons per man for the infantry, 13 tons per trooper for the cavalry, and 500 tons per gun for the field artillery.* At this rate a force of 75,000 infantry, 2500 cavalry, and 120 guns would require a total tonnage of 280,000 for their transport, which, after making necessary additions for hospital and other supplies and impedimenta, would fall far within her capacity for transportation. It is her policy to maintain two army corps, aggregating 63,000 men, in a condition of readiness for immediate foreign service at call. Considering also that much that would seem impracticable in peace may be accomplished under the sharp spur of war, we may fairly regard as an

* Report of the British Naval and Military Operations in Egypt, 1882, by Lieut.-Comdr. Goodrich, U. S. N.

inferior limit, in respect to time as well as numbers, the estimate of the Adjutant-General, U. S. A.,* that England could bring to our shores a force of 60,000 in 25 or 30 days from the time the movement was determined upon.

Such a landing force would naturally be composed of selected troops, and their policy would be to land at some small port where they could find a certain amount of landing facilities, or if necessary in some sheltered bay, under cover of the guns of the fleet, which would protect them from attack while landing and throwing up an intrenched line around their landing place. It would therefore probably be impossible to prevent them from making a landing and we should be obliged to meet the whole force in open battle, for which we would need an army superior in point of numbers in proportion as it was composed of inferior troops. Moreover, the enemy would have the advantage of the initiative and could throw his whole force at a single point, or feint at one or more points while landing at another, while we, not knowing where the attack was to fall, would be obliged to scatter our forces along the whole coast. The best method of meeting such an attack would be to spread small detachments along the shore to detect and give early notice of any attempt at landing and to offer such resistance as circumstances might favor, and hold the main force at railroad centres whence it could best be rapidly concentrated by rail at the point of attack. Our coastwise railroads are numerous and mostly double-track, and an indefinite amount of rolling stock is procurable. By holding the main bodies at such places as Worcester, and Springfield, Mass., Poughkeepsie, N. Y., Trenton, N. J., Wilmington, Del., Washington, D. C., Richmond, Va., etc., they could be kept well in hand, and by keeping the cars and locomotives for their transportation constantly alongside their camps a large proportion could be brought to any threatened point quite as fast as the enemy's forces could be landed.

The work of a coast guard could be very properly entrusted to and performed by the militias of the coastwise States. For the main force we should want, with no special information as to the probable point of attack, some 30,000 east of the Hudson River, 40,000 between the Hudson and the James, and 60,000 between the James and the Mississippi, mostly concentrated in the vicinity of Atlanta, or Macon, Ga., holding the larger force at the north as containing the greatest number of probable points of attack, and

* Letter to House Committee on the Militia, Feb. 4, 1890.

taking advantage of the interior lines possessed by the force in Georgia. This disposition would enable us to concentrate troops with sufficient rapidity at any point of attack between Portland and New Orleans, but would require, counting coast-guards and troops in Texas and on the Pacific coast, 175,000 men; a large disproportion of forces, but required by the necessity of guarding a long coast line and meeting the enemy at any point with a superior force.

This landing force would be composed mostly of infantry, with but a small proportion of cavalry and artillery, and we would consequently not require a large proportion of these latter arms to secure superiority in respect to them. The conditions would generally allow us to assume that most advantageous of all tactical policies, the defensive with offensive returns, by occupying a selected point such that the enemy could not disregard and leave it to one side, but would be obliged to attack it. In this case but a small force of cavalry would be necessary to keep him in touch during his approach, and to guard the flanks during the battle, particularly as we would be operating in a settled and friendly country where the inhabitants would be almost as good newsgatherers as cavalry. With the field artillery the case is different; this arm would have a fine field for its operation, on ground selected beforehand with reference to its use, and with the great power of modern artillery could not fail, if well handled, to render a good account of itself and be a most effective element of the defense. It would be particularly valuable, too, as a support to the morale of our infantry, which would probably be of poorer quality than the well disciplined regulars of which the enemy's force would almost surely be composed. A good proportion of artillery would therefore be a most valuable auxiliary and should not be omitted, but as the enemy would be poorly supplied with that arm, thus enabling us easily to obtain the artillery supremacy, it would seem that the normal amount of artillery, well trained and officered, would be sufficient. Our organization to meet this contingency should then contain artillery in normal proportion, but thoroughly well trained and officered; it may however be below the normal in cavalry.

The force that could be brought against us by way of Canada is much larger. From the figures given above relative to England's capacity for transportation by sea it is apparent that she would have no difficulty in transporting troops to Canada as fast as they

could be prepared for service, and maintaining them there. Her regular army numbers 160,000 at home, including the reservists; and 100,000 abroad, of which 70,000 are stationed in India and the remainder scattered throughout her colonies; and the Native Indian army which contains 134,000, of which, however, we may assume that practically no use could be made directly against us. In addition to this regular army, she has about 360,000 militia troops variously styled.* We may assume that she would send all her regulars, except the Native Indian troops, to the seat of war as rapidly as possible, replacing them when necessary by militia, and would follow with the militia as fast as they could be put in condition for service abroad. We might therefore expect that she would throw 100,000 regulars into Canada during the first month after the approach of hostilities became apparent,† most of the rest of the regulars and some militia, say 150,000 in all, during the second month, and another 150,000 or more militia during the third month; so that we would have to meet the onslaught of 400,000 troops with troops that had received training and organization in time of peace; after that our volunteers would begin to come into use.

Although these figures are professed to be but general in their nature, it is sufficiently apparent that a much larger force would be required to repel an invasion of our northern frontier than of our sea-coast. But though preparation for defense is not so necessary in this as in the case of the coast, partly because its probability is less, being possible to but one nation, and partly because its results would be far less direct and decisive—a campaign from Canada of several months duration for the possession of New York City would be much less attractive and tempting than a raid by sea for the attainment of the same result—I believe, and I am persuaded that it is the general opinion of our people, that a safe and sound policy in this respect for the United States to pursue is to be so prepared for defense as to be secure against a walk-over by an enterprising enemy at the beginning of a war, while we are organizing our immense military resources. This will be sufficient to secure from any foreign power a respectful consideration of our representations and a reference of conflicting claims to arbitration. From what has been said it appears that the true

* General Viscount Wolseley, in *Harper's Magazine*, February, 1890.

† "There could be landed on the shores of our lakes and bays where there are no forts, 120,000 soldiers of all arms of the service in thirty or forty-five days." Gen. Kelton, letter to House Committee on the Militia, Feby. 4, 1890.

object of our army organization is to provide a force of 150,000 to 200,000 trained and organized soldiers in peace, and for a large and rapid expansion at the outbreak of war. It may not be possible to obtain the appropriations to secure this result completely in peace, but the aim should be kept in mind by the military authorities and the form of organization adjusted to facilitate and suit its attainment.

The foregoing discussion sufficiently exhibits the principle and considerations which are imposed on the proper form of organization by our subject-title and the objects for which we should maintain an army. It is now in order to proceed to consider particular forms of organization, examining them in the light of the discussion just made, with a view to determining the one best suited to our case; and at the beginning we will review briefly the principal European systems, not with the expectation of finding among them a form adapted to our circumstances, but rather with a view to ascertaining what general principles have been adopted by those powers that have given the most attention to, and had the most experience in, the selection of methods of creating an efficient army.

The principal European systems are based on the principle of universal service, and are generally copied more or less closely from the German system. In this system, from the young men arriving at the age of twenty years, as many are selected by lot each year as are needed to fill up the ranks of the Active Army to the legal strength; the remainder go into the Ersatz Reserve. Those selected for the army serve seven years, two or three with the colors and the remainder on furlough or in the Army Reserve. They then serve five years in the first levy of the Landwehr and afterward until thirty-nine years of age in its second levy. The men of the Ersatz Reserve serve in it for 12 years corresponding to the service with the colors, in the Army Reserve, and in the first levy of the Landwehr, and constitute a recruiting field for these bodies during the corresponding periods of 3, 4, and 5 years. All men capable of bearing arms, between 17 and 45 years of age, are, while not serving in one of these branches, included in the Landwehr. The Army Reserve and the first levy of the Landwehr are called up for occasional field exercises, and the Ersatz Reserve receives a certain amount of drill. The second levy of the Landwehr and the Landsturm are not called out at all.

In the French system the annual contingent is divided into

two parts, one of which is retained on the lists and the other returned to civil life. Part of those retained are attached to the Active Army and the remainder go to a general reserve, which may legally be called up for service whenever the Budget allows it. Of those attached to the Active Army about two-thirds serve with the colors from three to five years, the remainder for six months. At the end of the five years they all go to the reserve for four years, during which they are liable to be called up for field exercises; they then go to the Territorial Army for five years, in which they are still liable to be called up for drill; and thence, till 45 years of age, into the Reserve of the Territorial Army, which also includes all retained on the lists but not attached to the Active Army, and receives no training. The Austrian and Italian systems are similar to those of Germany and France, and the Russian, though more complicated, is similar in general effect.

The English system differs from the foregoing in that the recruiting is voluntary. The enlistment is for 12 years, of which from 3 to 8 years are normally spent with the colors, and the remainder on furlough as a reserve on a small pay. The imperial army is supplemented by an extensive system of militia and volunteer organizations similar to our volunteer militia organizations, which correspond in effect to the German Landwehr and the French Territorial Army.

In general terms, then, the principal European systems which depend upon recruiting by conscription consist of an army and a recruiting reserve, both of which are primarily recruited from the young men arriving at their majority. Those assigned to the army serve with the colors a sufficient time for training, generally about 3 years; thence for a period of several years they pass into the army reserve, which is specially intended to fill up the cadres of the regular army on the outbreak of war, and which is liable to be called out for manœuvres. From the reserve they pass into an active or organized militia intended to constitute the army of the second line in war, and which is liable to be called up for field manœuvres; and from this they pass into an enrolled militia, which practically constitutes a sort of reserve to the active militia. The recruiting reserve has some drill and acts as a recruiting field to the several classes successively. The English system has no recruiting reserve, and its active militia is composed of volunteer organizations.

The fundamental principle common to all, is that the army of the first line consists of the active army and a reserve of men who have recently served in it, intended to bring its organizations up to the war strength; and the second line army consists of men who have had considerable training either in the active army and reserve or in the volunteer organizations. No more complete, simple, and effective plan could be devised for a system of recruitment by conscription, and though not entirely adapted to voluntary recruiting, its principles are sound, and in so far as may be they should be followed. We have an advantage that lessens the rigidity of the requirements as to readiness of our organizations for service, in our isolated position, which affords us more time for mobilization, so that we could include in our army of the first line all men already trained, and create our army of the second line from volunteers raised when the need of them should become apparent.

We may also remark that whatever the form of organization adopted, it must include a permanent military establishment containing a body of regular officers, to be the repository of military art and science, to keep abreast of the times in the matter of military knowledge, to prepare military plans and provide for the execution of military operations—all this in time of peace—and in war to constitute the general staff (in the sense in which the Prussians use the term) and act as organizers and instructors of the newly raised armies. The performance of these functions in peace is to be secured by the maintenance of a general staff (in the Prussian sense) and various staff departments of transportation and supply, and of a sufficient force of each of the branches of the service to act as a school for the training of officers in the duties of their respective branches. To properly impart the instruction of such a school the circumstances of war should be simulated as nearly as possible, a condition that makes it desirable that the form of organization should admit of the formation of tactical organizations of normal strength of all grades from the company to at least the brigade for drills and practice manœuvres. The peace army has also to perform the functions of a police force or armed support of the civil power in occasions of popular tumult; but the necessity for its use in this way in the older States is very exceptional, particularly as most of these are provided with a sufficient body of active militia to maintain the peace, and in the newer States and Territories is constantly

diminishing, and almost any organization that would fulfill its other objects would fulfill this also. We will now proceed to the discussion of three prominent forms of organization or military systems, each of which possesses merits adapting it to some of the objects to be attained by our army organization in peace.

Our present army organization or military system comprises in effect the regular army and the active militias of the States as the army of the first line, and relies on the creation of the army of the second line from a patriotic and intelligent class of volunteers with little or no preliminary training. This system gives us a force fully capable of maintaining order within the boundaries of the nation, acting as a police force, for which duty in both the Federal and State branches it seems to have been particularly designed, and beyond which but little attention has been given. It is to the fact that this has been made the primary object of the organization that most of its failings in other respects are due.

The rank and file of the regular army conform to almost none of the special conditions of adaptation to a republican form of government before mentioned except in being obtained by voluntary enlistment and, we may add, in allowing to the government a very full opportunity of relying on the patriotism of the people for support in war. It is composed largely of men who are not citizens of the Republic and almost wholly of men who are not fairly representative of the great body of our citizens, and who serve almost purely for pay with little admixture of patriotic sentiment to care for the general welfare of the Republic and its people.

The most important defect of the present system, a defect which is yearly becoming more and more serious as men possessed of war experience acquired in the Rebellion pass beyond the age for active service, is its utter lack of systematic method of creating a trained reserve and, in fact, of adaptability to any organized and effective form of expansion on the outbreak of war. The great controlling idea throughout our whole history from the beginnings of our existence as a nation, has been to keep a small standing army and rely on the voluntary uprising of the nation for the defense of our rights and territory. This idea, though often popularly ascribed as the outcome of our form of government, more truly arises from the circumstances of our relations to other nations, the local character of our interests, and the lack of ambition for foreign conquest. Though never a sound idea

from a military point of view, it becomes less and less so as armies become larger and more highly organized, and military operations more scientific in character and especially more prompt in preparation and brief in execution, and as our interests reach out over the globe and conflict with those of other nations. If we would maintain an army smaller than would be needed at the outbreak of war we must provide a systematized method of expansion capable of raising it to a fair war strength. This condition is a necessary complement of the other, and it is also essential that the men added in the expansion must be already trained if the army is to take its place in the first line.

It is true that a certain sort of reserve of trained men exists practically in the men scattered about the country who have had military training in the army or in some other way. The most important class of this reserve consists of those who have served in the army and have been discharged therefrom. Many men in this class would rejoin the army if the call came soon after their discharge, but the number would decrease year by year till it would practically cease with those who had been out of the service, say, ten years; and it would be perhaps a liberal estimate to take one-half as the average proportion for the ten years that would promptly reënlist on the outbreak of war. The number of men receiving discharges from the army annually is about 4000 of which, however, about one-third reënlist, so that we have about 2700 returning annually to civil life, giving according to the above estimate, about 13,500 as the available reserve from this source, of which about one-seventh belongs to the heavy artillery. Another source is found in the men who served in the volunteers during the Civil War. There are undoubtedly a considerable number of such men sufficiently able-bodied at present to serve for a short campaign not involving much marching, as in defense of the coast, and who would be available if intermingled with men of some recent training notwithstanding the length of time that has elapsed since their service. But though this service might furnish now a considerable reinforcement it will so soon have completely ceased to exist that any plan for the future must leave it out of account. Then again a few might be obtained from the ex-members of the national guard of the States and from among those who have graduated from colleges or schools where military exercises are practised; but these would generally enter the volunteer organizations that would be in process of formation

in their respective States and but few would join the regular army. Taking these sources together it is hardly possible that we may rely on being able to get enough trained recruits in a short time to raise our regular organizations to normal strength, which would require about 20,000 recruits, giving us a force of 45,000 in all; and this represents, I believe, the extreme limit of what may be considered as the existing reserve of the regular army. This is omitting the legacy of trained men from the Civil War, but we are near the time when it will have passed away, a point which marks the beginning of the necessity for the adoption of such an organization as shall provide a competent reserve for the purpose of expanding the organizations of the regular army and, in so far as possible, facilitating the formation of new organizations.

The second portion of the army of the first line is composed of the Volunteer Militias or National Guards of the States. These bodies number about 100,000 officers and men of the troops of the line, very unequally distributed among the States, and quite as unequally well trained, disciplined, and organized. Fortunately, in those States where they are most numerous these qualities are fair so far as the line branches go. The staff departments are as a rule not sufficiently well organized for efficient field service, but this would not much matter if the troops were combined into brigades with the regular army.

It is largely a matter of estimation what portion of these troops the general government could rely on obtaining promptly for service on the outbreak of war. Even though it be admitted that the President has power in the constitutionally prescribed exigencies to call out the militia organizations of the States by direct orders to their commanding officers, it is not at all likely that he will ever act in this manner, but will rather call on the Governors for the militia. It is unfortunately too probable that some of the Governors when so called on would respond with companies of volunteers or conscripts from the enrolled militias, retaining control of the active organizations for their own security. Whether such action, if taken, would be legal or illegal would not affect the result practically, the mere raising of the question being sufficient to prevent the prompt employment of the organizations in question. However, the adoption of the term "National Guard" for their organized militias by many States indicates a purpose (if there be any meaning in the term at all) to regard them as for the use of the federal government at its need, and we

may perhaps reckon on getting most of these organizations. Gen. J. C. Kelton, U. S. A., gives two-thirds as the proportion of the total organized force which we might expect to obtain for use with the regular army at the beginning of a war.* According to this estimate we may then reckon on about 65,000 to 70,000 militia troops as a complement to the regular army to form the army of the first line.

It is to be considered also that these organizations contain the men on whom reliance would be most placed for the formation and training of the volunteer organizations that would be in process of formation, and it would be a bad policy to take them all; especially should a considerable number of officers be left with the States for this purpose. In view of this fact it would seem that it would be a good method to combine the militia organizations into organizations of full strength, thus setting free a large number of officers and non-commissioned officers for the above purpose. The regiments would average probably about 400 strong at muster in, and by combining companies each could furnish a four-company battalion, and three such battalions might be combined into a regiment, thus releasing from one-half to two-thirds of the officers and non-commissioned officers of all grades. The infantry regiments thus formed would be about twice the number of the regular infantry regiments, and they could be well organized into brigades consisting of one regular and two militia regiments, the regular colonel commanding in the absence of the brigadier-general, after the principle employed by McClellan with the field artillery in the organization of the Army of the Potomac. The troops of cavalry and batteries of field artillery of the militia, being few in number and not generally organized into battalions, would perhaps be best combined into battalions with the regular troops and batteries.

On the whole then, the capacity of the present military system may be said to be about 100,000 men, exclusive of the heavy artillery, in the first line; of which about one-third would be troops of good training and discipline and the remainder, though fairly well drilled, would have had no active service. This is not a sufficient field force to meet properly the contingencies already mentioned as probable, nor even the one for which Congress has begun the preparation in the form of coast defenses. Our position calls therefore for an increase in some manner, and since our present

*Gen. Kelton, U. S. A., in *The Forum*, Nov., 1889.

regular force is amply large for all other purposes than that of providing for the creation of a proper war army, the logic of the situation would indicate that the needed change in our military system lies, not in the direction of the increase of the regular army as it is, but rather in that of increasing the number of men in the available reserve or supplementary troops—men who have training but are not supported by the government or withdrawn from civil pursuits. Let us now briefly notice some of the amendments to the present military system that have been proposed with the object of facilitating expansion at the outbreak of war.

There is first the proposal for a closer connection between the regular army and the active militias of the States, of which much talk is heard nowadays. This would undoubtedly be beneficial to both sides, to the militia in giving them a better knowledge of the spirit and discipline of the regular army, and to the latter in furnishing to the officers a better acquaintance with the material of our National Guards and that from which our volunteer armies would come, and also in creating a more favorable sentiment in the country toward the regular army, which might find its reflection in congressional consideration. But there are limitations to this plan, and when it is proposed, as it frequently is, that the President shall call them into service for a period of training each year, it would seem that these were passed. How could the President legally call the militia into service except in the exigencies prescribed in the Constitution, or administer the discipline prescribed by Congress, even if the offer of service were voluntary? There would be no power for enforcing discipline, and no appropriation for pay would be constitutional, though this latter objection might be indirectly met by an allowance to the States for the support of the militia, to be distributed by them. The establishment of a Bureau of Militia in the War Department, a proposition now under discussion, would undoubtedly have some good effect in bringing the militias of the States into a more uniform system and connecting them more closely with the regular army. But in respect to any of these plans it may be remarked that any attempt at a semblance of authoritative control, either of the adjutant-generals of the States by a federal bureau or of single organizations in a combined camp, would naturally evoke opposition and defiance from some of those sought to be controlled, and it is to be considered whether the attempt, possibly unsuccessful, to do by persuasion what ought in any military organization to

be done by authority, would not have such a degrading effect on discipline as would more than counterbalance any good results that might be obtained.

It has also been proposed to form an apprentice battalion in which youths of 16 to 18 years of age, while acquiring a certain amount of schooling or manual instruction in various trades, could also be given a thorough training in the drill regulations and in the spirit and methods of the regular army, with a view to spreading a greater amount of military knowledge of a thorough kind throughout the country, where it would be of use in giving direction to the military training of the people both in war and in peace. This plan would undoubtedly be productive of good, and it will be again referred to.

Another plan proposed for the accomplishment of the same end in a higher degree, and ably advocated by Gen. A. V. Kautz in his Departmental Report for 1891, is to so improve the conditions of service in the regular army as to attract to it a superior class of young men who, having served an enlistment, would return again to civil life. The great objection to this plan is that young men of the desired grade are engaged in establishing themselves in life and cannot spare three to five years to army service, added to which is the disinclination to subject themselves to the strict, and more dreaded because unknown, discipline of the regular army, particularly when the outlet to their military ambition is offered in organizations near home in which, even though the discipline should be strict, it would be but occasional with frequent relief from its exactions. But on the other hand it would only require about 75 men from each congressional district to fill the ranks of the army, or an annual enlistment of 25 for 3 years or 15 for 5 years, numbers so small that it is quite possible that the plan could be practically carried out. It would be greatly facilitated by the localization of regiments for recruiting, and the earnest canvassing of each regimental district by the regimental recruiting officer. Gen. Kautz considers the plan to be desirable as a means of making use of the army as a training school, with the object of facilitating expansion in the event of war, which he most justly regards "as the highest duty of our small army in time of peace"; but it is believed that the system to be proposed later on would accomplish this object more fully than the plan under discussion.

The English plan of a long enlistment, the latter part being

spent with the reserve, might be practicable, but it is believed that their period, 12 years, is too long. By making the period of enlistment 6 years, the last three, if a private, to be spent on furlough in reserve, on a small pay, and allowing no re-enlistments, a sufficient reserve could be created to fill the cadres of our present organization to their full war strength, with well trained material. The reservists would hardly forget their military training so soon as to make it necessary to call them up for drill at all, and the only restraint that need be put on them would be to inform the military authorities at stated intervals of their address, which act should be a prerequisite condition to drawing their pay.

If the present military system is to be retained, energetic measures should be taken to adapt it to the new conditions into which it is entering. These demand a change in the tactical organization of the infantry and heavy artillery, and such changes in the organization of the army as shall better adapt it to the rôle of organizer and instructor of the military strength of the nation and further, the federal authorities should seek by all suitable constitutional methods to develop and unify the active militias of the States, in order that they may be susceptible of prompt, combined, and effective employment by the general government in case of need. To this latter end the United States should at any rate supply in kind to the State organizations arms, equipments and ammunition, in suitable quantities for instruction in the use of the arms; then if more aid were to be extended, camp and garrison equipage should be provided, and finally money and all aid should be based in amount on only such organizations as, being nominated by the States for the purpose, should be ascertained by a federal inspector to be up to the required standard of quality. The present method of assisting in the support of the militia, whereby some States receive from the federal government more than they expend on the militia and others only one-twentieth as much, is ridiculous. Congress should also go to the extent of its constitutional power in providing for "organizing" and "disciplining" the militia, with a view to securing the greatest practicable degree of uniformity and efficiency.

To increase the capacity of the regular army to provide for a rapid expansion in war, the plan proposed by Gen. Kautz, and that of a long enlistment partly spent in the reserve, should both be at least tried with a view to testing their practicability and

usefulness. As to the changes in tactical organization, no one questions the desirability of the 3-battalion organization for the infantry regiments. The proposal to adopt a corps organization for the heavy artillery is not so generally approved, but it would seem to be an advantageous and desirable change. Heavy artillery troops are not, strictly speaking, troops of the line—not troops of the line of battle—but rather technical troops, for which a special organization would be most suitable. This arm is not required to manœuvre in the field, but only to man certain immobile permanent works, and its organization should therefore be based on the natural divisions and subdivisions of these works, into ports, garrisons, battalions, and batteries. Its action is limited to firing on what comes within range of its guns, without power of coöperating in any other way with other forces, and hence it would be tactically useless to place it under a common commander with either the land or naval forces operating in connection with it; so that it would be practicable to give to it, what the technical character of its service demands, the care of a technical head.

The essential defects of the present system are that no adequate reserve of trained men is provided by it, and it does not provide for the regular army acting in its proper rôle as instructor and organizer to the reserve of citizen soldiers and as a nucleus for the organization of a war army, of which it would be a part only, and in no sense a nucleal part, centre of aggregation, or basis of organization; and further, barring its services as a police force in the West, the necessity for which is continually decreasing, the results obtained by it could be reached much less expensively in other ways. We are thus brought to the consideration of systems founded on a combination of a regular army with a force possessing the characteristics of the volunteer militias of the States, but under federal pay and control. Two such systems will be described, in one of which the two classes would be kept in separate organizations, and in the other, combined in the same companies and regiments.

The establishment of a federal national guard has seemed to many to be the only means of escaping from the burdens of a large standing army on the one hand, and on the other, from the lack of thoroughness and uniformity of training and discipline, and the insubordination to federal authority when opposed to State sentiment, which have on more than one occasion in our

history proved the cause of national disgrace. This method seems to be well adapted to the conditions of our subject-title and capable of affording a practicable solution of the problem. The principle of intermittent service for training calls for a minimum of expense and produces a maximum ratio of effect to cost. It is well suited to the controlling conditions in our country, as is proved by the spontaneous trend of the State militias in this direction. Its capacities and limitations are already well understood, and it seems to the writer to be capable of producing the degree of training and discipline necessary to our purpose.

The Federal National Guard should contain two classes, the Active Class and the Reserve Class. Enlistment in the former should be for not less than two years in order to insure thorough training. The Reserve Class should consist of men who enlist in it after having served in the regular army or a full enlistment in the Active Class. The Reserve Class might be organized into companies separately, but it would seem to be a better plan to make each company to consist of both classes, say in about equal proportions. The time of training of the Active Class and Reserve Class should be about the same as for the next system to be described; that of the Reserve Class would be much less than that of the other, but what training it did have would be with it so that the company would present full ranks for a part of its drills. This method would naturally furnish an opportunity for men once trained to maintain their military connection without unnecessary outlay of time and corresponding expense to the government, and would insure full ranks when called into service.

The principal unit in this organization should be the battalion, and the grade of major as battalion commander, should be the highest grade of national guard officers. If it be also made a condition that guard officers should rank next below officers of like grade in the regular army the army authorities would then have great freedom to select suitable regular field officers to command the guard regiments in peace and war. These officers should act through the battalion commanders, and would secure in peace regulation and unification of the training and discipline of the guard, while still reserving to the guard officers the immediate control of the men, and in time of war would give the command of the tactical unit, the regiment, to the more highly trained officers.

The appointment of officers and non-commissioned officers is

a matter of the gravest importance to the efficiency of any command. The method of election by the members of the organization would be a good one if the object to be obtained was the administration of the affairs of the command to the satisfaction of the members; but the object of a military organization is to secure objects external to it, at the expense of its own liberties and sacrifices, the attainment of which requires the maintenance of a rigidity of discipline entirely inconsistent with the idea of giving subordinates control of any nature over the actions of their superiors. As General Sherman says on this subject in his memoirs, "The fact that soldiers would like to have a good fellow for their captain is the best reason why he should be appointed by the colonel or superior authority instead of being elected by the men." The appointment of officers would of course lie with the President, but the War Department should make the nominations. The selections might very properly be made by boards organized for the purpose, the fault of the ordinary method of election not being so much election as the character of the electors, who should be superior in rank, not inferior, to the nominee. The immediate commander concerned should always be a member of such a board of examination and selection; and in all cases selection should be confined to the next lower grade in the command in which the vacancy exists and should be preceded by a thorough examination as to fitness. The appointment of non-commissioned officers should be made by the battalion commander upon nomination by the captain. The promotion by seniority is not so well suited to the national guard as to the regular army where all officers make a life business of the military profession, whereas in the national guard the military service is subordinate to other obligations. It would probably be well also to limit the terms of officers to five years, though not barring reappointment.

The guard should be recruited by volunteers and not by conscription. Conscription is a suitable method when almost the entire manhood of the country is required for service, but when only a small proportion is to be enlisted it is much better to obtain the men by voluntary enlistment, making the pay sufficient to obtain the required numbers. This method practically commutes in taxes the obligation to military service in support of the government which rests upon all, using the commutation money as compensation for the service when performed. It gives every man the choice between rendering his obligation in money or in ser-

vice, and so long as it should prove capable of securing the desired result, it is most improbable that Congress would ever consent to any method of conscription.

Remarks with respect to the localization of troops, enlistment, hours of service, pay, making the service attractive, etc., made in regard to the next system to be discussed will apply in substance to this also, and so we will proceed to the description of this plan and make the discussion of both at once in these respects.

We thus come to the consideration of the third method, the combination in the same organization of the regular army and the federal national guard. It is embodied in the shape of a military system or form of organization that has, so far as the writer knows, not been hitherto proposed for our army. If it be true that it has never been proposed, this fact would seem to argue against its applicability, but it is believed that it may be sufficiently accounted for by the unfavorable conditions of the service arising from the necessity of stationing the army on the frontiers of civilization for the protection of its pioneers from the hostile savages. But this necessity is fast disappearing; even now a third of the infantry is east of the Mississippi, and quite two-thirds, with all the artillery and a good portion of the cavalry, are stationed in large posts removed from any probable theatre of operations, but on the railroad. A still larger portion could be so stationed were there any important advantage to be gained thereby, provided only that it should be obtainable by rail for the suppression of any considerable disturbance, such as the outbreak of the Messiah craze two years ago; and the proportion so available will continue to increase from year to year as the western country and the Indians become more settled, and will at no distant day comprise almost the whole. It is this change in the character of the service demanded of the army that makes now practicable this plan, hitherto impracticable, and moreover renders the present a critical period in the history of the army, pregnant with good or ill results according as the organization is well or ill adapted to the new condition of its existence. The system may be described as follows:

Let the army be made by law to consist of three classes, a First or Nucleal Class, a Second or Supplemental Class, and a Third or Reserve Class; the Nucleal Class to consist of officers and men under the same conditions of service as at present; the Supplementary Class to contain both officers and men, and in-

tended to serve only for training except in cases of emergencies, but with no reservation in the enlistment as to the amount of service to be rendered at the call of the President; the Reserve Class to consist of such officers and men as, having served a term in one of the other classes, may be appointed by the President to or enlisted in this class.

Let us take for description and discussion the case of the infantry as being both the most important and simplest. Let the regiment be organized on the 3-battalion system, one active battalion to be manned with the Nucleal and Supplemental Classes and the other two to be skeletonized and contain only the Reserve Class. Let each active battalion have a major and battalion staff and four companies, each with the following organization:

Grade.	Nucleal Class.	Supplemental Class.	Total.
Captain,	1		1
Lieutenants,		2	2
1st Sergeant,	1		1
Sergeants,	1	3	4
Corporals,	3	9	12
Musicians,	1	1	2
Privates,	21	63	84
Total enlisted,	27	76	103

Each company would have 1 Nucleal and 3 Supplemental sections; the 4 Nucleal sections of the battalion could be combined to form a Nucleal company for service in exigencies without in any way disturbing the Supplemental Class.

It would be highly necessary in such an organization to have the battalion and company commanders always present, hence a sufficient surplus should be provided to supply all details and other causes of absence. There should also be a number of lieutenants of the Nucleal Class preparing by service in companies, at service schools of application, and as battalion and post staff, for the more responsible positions of command to follow. Let the officers' list for the Nucleal Class be then, for each regiment thus specially organized, 1 major, 6 captains, and 4 lieutenants; and let there be for each three regiments, 1 colonel, and 1 lieutenant-colonel. Then let each major command a battalion and also have charge of the skeletonized portions of the regiment to which it belongs; let the colonels be given a general or brigade command over about three regiments, and employ the lieutenant-

colonels for details and to act in the places of the colonels or majors absent from their proper commands on detached service or for other cause. The extra captains would fill the positions of staff officers to the colonels and all details and absences in their grade. It should be the aim to give each lieutenant one or more years service attached to each company, the course at a school of application, and a tour as battalion adjutant and post staff officer, before promotion, and the number should be based on this condition.

In the Supplemental Class let the first enlistment be for two years and reënlistments for one year, and let all enlistments be made at the same time, preferably at the end of the open-air season. Appoint the corporals of this class from the privates that have served at least one enlistment, the sergeants from the corporals after at least one year of service as such, and the lieutenants from the sergeants of at least one year of service as such, and let the term of the lieutenants be two years, appointing one each year. Reënlist privates and non-commissioned officers and reappoint lieutenants if necessary, but let it be a principle of the organization that but one term should be served in each grade if there be competent candidates for the positions, in order to the creation of a large Reserve Class. Selections for these appointments should be made by a board consisting of the battalion commander and the company commanders of the battalion after thorough inquiry among all possible candidates and examination as to fitness.

These organizations should be stationed in populous districts in order that the men of the Supplemental Class might readily reach the rendezvous for drills. Each battalion or smaller separate command would require an armory which need only be a two-story building covering sufficient area for a drill hall on one floor and barracks for the Nucleal Class, kitchens, offices, etc., on the other; or these latter might be provided for in separate buildings and the armory be a mere shed sufficient for protection from the weather. It should if practicable be located in a plot sufficiently large for a drill ground, the whole constituting a post. If necessary in the large cities only the armory need be in a thickly settled portion of the town, the post and drill ground being in the more open part, but conveniently reached by a public transportation line. Wherever practicable the entire battalion should be united at a single post, but a very large and fruitful field might be

opened up to our operations by distributing it among neighboring towns, each capable of supporting one or more companies, and all sufficiently closely connected to admit of assembling the battalion by rail for battalion drills; in this case the major would establish the headquarters of the regiment at one of the posts and regard the others as sub-posts. The number of battalions to be provided for is so small that very suitable localities might be found for each.

Let the service normally required of this class for training consist of one evening attendance per week during the in-door season, one afternoon attendance per week during the open-air season, and one period of a week or ten days of encampment. The hours of training should be arranged in each command to suit the climate or other conditions, but might normally in our middle latitudes conform practically to the following schedule, which shows also a proposed allotment of time to the various subjects to be taught, with a view to illustrating the adaptability of the plan to the purpose in view.

The battalion would be assembled under the command of the major for the encampment and battalion drills. Other drills would be under the immediate control of the captains, who should apportion the work of instruction among their subalterns and non-commissioned officers in such a way as to give them habits of responsible command and at the same time secure the instruction of the men.

The schedule on page 261 would give for the first enlistment of two years about 50 hours of squad drill, 60 of company drill, 32 of battalion drill, 36 of aiming drill and gallery target practice, 8 of instruction in target practice on the range (the range practice would be indefinite in amount according to the available time of the individual), 34 hours of ceremonies during which much instruction in company drill could be given, 20 of general field instruction, and two periods in camp. It would seem that this schedule should provide for a very thorough and efficient training and discipline, much more so than the National Guard receives even in the States having the most efficient organizations, and that it might be considerably reduced if necessary and still secure a good degree of these qualities.*

* Replies from 11 regimental and company commanders of the active militia organizations of the States of Massachusetts, New York, Pennsylvania, and Iowa, to the question, "Assuming trained and efficient officers and non-commissioned officers, how

AMOUNT AND USE OF TRAINING SERVICE OF THE SUPPLEMENTAL CLASS.

First year.	Months.	No. of drills.	Hours. P. M.	Subsequent years.
School of the soldier and evolutions of a section and platoon.	Dec. to April.	22	7 30 to 9.30	Instruction in aiming. Gallery target practice and review of same as first year.
School of the company in close order. A ceremony after supper.	May.	5	4.00 to dark.	Same as first year. The company assembled.
Evolutions of a section in open order. A ceremony after supper.	June.	4	4.00 to dark.	Instruction in target practice on the range. A ceremony after supper.
Evolutions of the company in open order. A ceremony after supper.	July. Aug.	8	4.00 to dark.	Same as first year. The company assembled.
10 days encampment, following the completion of Co. drill if possible. School of the battalion the principal drill.				Do.
School of the battalion.	Sept.	4	3.00 to 6.00	Do.
Instruction in going into and leaving bivouac, intrenching, etc.	Oct. Nov.	7	3.00 to 6.00	Regular attendance required during a portion of the time only and devoted to estimating distances over diversified country and possibly skirmish target practice. Target range open every day for qualifications in higher grades of marksmanship.

The amount of time required by any plan is a most important condition of failure or success, and the inability to obtain as much as is desired is the rock that wrecks nearly all the schemes for the reform or improvement of militia training. If the hours of training are made too onerous the plan fails simply for lack of recruits. Most desirable men have occupations that fix narrow and in many cases unyielding limits to their available time. This

many hours of drill would be required to make a company of recruits well drilled in the schools of the soldier and the company in close order?" gave from 15 to 40 hours; but 8 were included between 18 and 30 hours, and the average of all was 25½ hours.

is especially true of the day-time—there is much greater freedom in the evening. For this reason the active militias generally have nearly if not quite all their drills in the evening, and mostly in the winter when the evenings are long. There should be no doubt of being able to get all the evening time required, but the possibility of getting so much time during the day as is included in the above schedule may seem to be very questionable. On this account the open-air drills have been generally set for the season of the year when daylight lasts longest, and to begin at four o'clock (the time the base ball games commence), utilizing the whole remaining period of daylight. It is assumed that Saturday would be generally the best day for open-air drills, and the steadily growing movement toward a half-holiday on Saturday would be a favorable condition; then also the number to be raised under this plan would be very small in proportion to the population, thus improving the opportunities of securing a sufficient number of men who could spare the desired time. Still another favorable condition is presented by the schedule in that the drills continually become less dreary and mechanical and are conducted under pleasanter circumstances. The dry armory drills are nearly all during the first winter; the afternoon drills will not be so tedious, and end with a ceremony in the pleasantest part of the day, and during the second year a good deal of time is devoted to target practice. So that no more dry, close order drill in the armory is given than well drilled militia organizations now undergo. Indeed it is not believed to be desirable to improve much, if any, on their close order drill, but rather to train the soldier well in open order exercises and other knowledge pertaining to the profession, in which the active militias are as a rule most defective. The active militias generally have about 40 drills annually in the armory in close order exercises; what the above schedule adds to this is all of a more agreeable nature. However, should it appear that the requirements asked for afternoons were too onerous, a considerable reduction might be made in them, and, if necessary, more evening time might be obtained.

The way to meet this obstacle is to enhance in every possible way the attractiveness of the service—the true attractiveness, not the fictitious attractiveness that comes from lowering a high standard of excellence to be attained only by honest effort; merely "tin soldiers" are too ridiculous to be truly popular. To this end it should be the fundamental principle that every availa-

ble and legitimate means must be employed to make the service attractive and popular, acting upon the love for military pomp and show, the martial instinct that delights in the orderly array and seemingly irresistible action of well trained and disciplined bodies of men, and the social and gregarious qualities which prompt young men to get together for manly amusement, but invoking always the self-approbation and self-respect that come from the contemplation of duty well done.

In accordance with this principle the public should be admitted to the ceremonies provided for in the schedule for the summer months, and it might be hoped that they would prove to be a popular entertainment to the friends of the men. So also commanding officers should evince a ready spirit to take part in parades and celebrations of a local nature, and endeavor in all proper ways to make the people feel a just pride in their local organizations. The use of the armory by the men for grand military balls and the like should be freely granted, and the men should be allowed to wear their uniforms on occasions of official or social ceremony, but not at their daily work, being liable, however, to trial by military court for actions committed in uniform of a character to disgrace it. In short every indulgence not inimical to the discipline of real, honest work should be allowed. The formation of a reading-room and gymnasium for the use of the members of the organization might also be advisable in some localities. It should always be the aim of commanding officers of all grades not to take matters indifferently and merely drill such men as offer themselves, but to exert themselves actively in the cultivation of an *esprit de corps*, and that very essential element to the success of any similar plan, the good estimation of the public.

An important thread in the cord that draws young men to military service of this nature, and which those who would reap success must not strain beyond its strength, however desirable it may seem to produce greater effects, is that of pay. It is not the principal element; this is found rather in martial ardor and sentiment, and it is undoubtedly the fact that the militia organizations of the country, and the proposed one would not differ from them in this respect, are supported by the military spirit of their members, and that nowhere is the service rendered for the pay, which is regarded as a mere mitigation of the pecuniary sacrifice of those who give their time to the service.

To fix definitely the rates of pay is a delicate matter. For our

guidance in this respect we may remark that the duty of furnishing military support to the government devolves on all able-bodied men alike, and in the absence of conscription it is commuted and paid in taxes by all, those who engage in active service as well as those who do not. To completely reimburse those serving, for their pecuniary expenses or losses, is nothing more than an act of mere justice in the distribution of the burden of support of the government. Theoretically, the minimum pay should then be so fixed as to prevent the necessity for pecuniary sacrifice on the part of the members of the organization. It may also be said that "the laborer is worthy of his hire"; and that a properly adjusted hire will produce the laborer. As a matter of practice however, the pay must be adjusted to the common law of supply and demand, and if our schedule does not produce the desired results it should be increased until it does. In any case the cost of such service must be less than that of the Nucleal Class sustained entirely by the government.

The States having the best active militias pay the privates on an average about $1.50 per day for actual service, not counting evening drills; but as attendance at such drills is nearly always a matter of some small expense directly or incidentally, it would seem to be well to provide a small pay for them. Let the pay of the Supplemental Class be based on service rendered; thus a certain sum for each attendance on evening drill, a larger sum for attendance on afternoon drill, and a per diem rate for longer periods, and let it be based largely on the principle of reimbursement of expenses, a condition which will make the pay of different grades nearly the same.

SCHEDULE OF PAY FOR THE SUPPLEMENTAL CLASS.

Grade.	Each attendance of less than 3 hours.	Each attendance of from 3 to 6 hours.	Per day for attendance of more than 6 hours.
Lieutenant	$0.25	$2.00	$3.50
Sergeant	0.25	1.50	2.50
Corporal	0.25	1.25	2.25
Private	0.25	1.00	2.00

This rate of pay is believed to be more liberal than is provided by any of the States, but it is not considered more than a fair compensation for sacrifices other than the giving of the mere time and labor. As will be seen below there will be some expenses for uniform to come from it, particularly for the lieutenants. The annual pay for each grade would then be about as shown in the following table.

TABLE SHOWING ANNUAL PAY OF EACH GRADE OF THE SUPPLEMENTAL CLASS.

Service.	Lieutenant.	Sergeant.	Corporal.	Private.
22 evening drills	$ 5.50	$ 5.50	$ 5.50	$ 5.50
28 afternoon drills	56.00	42.00	35.00	28.00
10 days in camp	35.00	25.00	22.50	20.00
Maximum pay	96.50	72.50	63.00	53.50
Or, making deductions for unavoidable absences, say	90.00	65.00	55.00	45.00

The full uniform, except overcoat which might be purchased if desired, should be furnished at the first enlistment, but should however be paid for in case of discharge before the expiration of the term; but subsequently the uniform should be purchased by the men. Subsistence in camp and the suppers during afternoon drills should also be furnished. Taking the cost of the suppers at 20 cents per head and the subsistence in camp, cooked by the men themselves, at 65 cents, the annual cost for subsistence would be about $10.00; and assuming that about one-half of the privates enter a first enlistment annually we would have as follows:

ANNUAL COST OF PAY, CLOTHING, AND SUBSISTENCE FOR EACH GRADE OF THE SUPPLEMENTAL CLASS.

Items.	Lieutenant.	Sergeant.	Corporal.	Private.
Pay	$90.00	$65.00	$55.00	$45.00
Clothing				10.00
Subsistence	10.00	10.00	10.00	10.00
Total	$100.00	$75.00	$65.00	$65.00

There would be other expenses chargeable to this plan, among them those for medical attendance for injuries or illness resulting directly from service rendered, and those for transportation of companies in some cases when assembling the battalion for camp and battalion drills, but these items could not be large and would compare favorably with the expenses for similar purposes in the army as at present organized. The item of barracks and quarters, including armories, would be much more serious, but could be hardly as great per man as in the service at present, where the government furnishes quarters for all the men.

The Third or Reserve Class would consist of officers and men who, after having served in one of the other classes, should be appointed or enlisted in it. Men joining this class should be assigned to the companies of the skeleton battalions of the regiment and required to attend for a certain small amount of train-

ing, intended as a review of their previous instruction, say one-fifth as much as is required of the Supplemental Class, the rates of pay for which should be the same as for the Supplemental Class. They should also be allowed the use of the regimental armory, drill grounds, encampments, etc., for any extra amount of service they might choose to give without pay. In both this system and that of a Federal National Guard, the attraction to enlistment in the Reserve Class relatively to that of a first enlistment are greater than those to reënlistment in the State militias, in that the first enlistment is shorter and the amount of drill required of the Reserve Class is very much reduced. It would appear that in the State militias where the term of first enlistment is three years, one-third to one-half of the men reënlist, and that, in general, rather more than half of the men have been in service more than two years, whence it may be assumed that the proportion of Reserve Class to the Supplemental Class, and to the Active Class in the Federal National Guard, could easily be as great as three to two and might even be as two to one. This proportion would naturally be larger for non-commissioned officers than for privates and larger still for officers, a condition favorable to a large expansion on mobilization. Applying this ratio to the Supplemental Class, and counting on some addition from the Nucleal Class, we might expect to have about 600 enlisted men in the Reserve Class in each regiment.

Expansion on mobilization could be of several degrees; expansion of the first degree would consist in completing the regiment, already containing nearly a full complement in its Reserve Class; expansion of the second degree would consist in forming from the material at hand two regiments, that of the third degree in forming three regiments, and so on. To make the expansion, the officers and non-commissioned officers required should be obtained by promotion of the trained material belonging to the first regiment, and any men left over should be divided equally among the companies to be formed, which should then be filled up by enlistment of new recruits. Expansion to two regiments would, after making allowance for the absorption of some officers by staff appointments, etc., allow all field officers to be drawn from the officers of the Nucleal Class, and the company commanders from officers of the Supplemental and Reserve Classes, and would furnish trained men for the non-commissioned officers and also for from a third to a half of the privates. This expan-

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sion would give regiments that, being well commanded throughout, could be very soon made effective, say in three or four weeks; and as this time would generally be available after the probable approach of hostilities became apparent, it may be assumed to be the normal expansion.

Expansion into three regiments would be accompanied by a considerable loss of effectiveness, or increase of time required to reproduce it, as the battalion commanders would have to come from the lieutenants of the Supplemental and Reserve Classes, and many of the company commanders from the promotion of non-commissioned officers: all of the non-commissioned officers would be trained, but the privates would be mostly new material. Nevertheless, such regiments would be better than volunteer regiments because of their trained officers, but the superiority would perhaps cease with this degree. The mobilized regiments might be formed simultaneously if the time for preparation for war was ample, or successively by the selection of the officers and non-commissioned officers of the new regiment from the regiments already formed, filling their places by promotion in these regiments. For the purpose of recruiting during and after mobilization, a district, including the post of the original regiment, should be assigned to each group of regiments, and an officer placed in charge of enlisting, drilling, and forwarding recruits to the regiments as fast as needed.

The organization of the cavalry should be quite similar to that of the infantry. Each man should furnish his own horse, receiving therefor say 50 cents for afternoon drills and 75 cents per day for continuous service, the government furnishing horse equipments and forage corresponding to the subsistence furnished the men. Each post would be able to draw from a larger area than in the infantry, and moreover the troop would be smaller than the infantry companies, so that it might and should be stationed in the rural districts, where most young men have a horse at their command, and particularly in those sections of the country where good horses abound and good riding is customary. The drill schedules should of course be arranged to suit the conditions of this arm. It may be here remarked that in some of the Southern States about one-half of the active militia is cavalry.

In coming to the consideration of the field artillery we are confronted with special conditions which demand a solution varying somewhat from that adopted for the other arms. The most

prominent of these conditions is the necessity of having a large proportion of field artillery in a high state of efficiency in the army of the first line in war, on account of its great value when well handled, not only in aiding, but also in giving steadiness to, the green troops of which the army would be largely composed. This condition requires the maintenance of a large proportion in peace, with such organization as to allow of the required expansion on mobilization without reducing the efficiency. On a war footing it should have a large proportion of field officers, in order to keep it well in hand and secure the proper disposition and selection of target in battle, and it should also be able to completely fill its roster of officers and non-commissioned officers from men who had received training as such in peace; the privates do not need so much training as those in the infantry, but the officers and non-commissioned officers require, for the effective performance of their work, a technical training of a high degree. Another important condition is that it is impracticable to have each rider furnish his horses as in the cavalry, and to maintain them in continuous service is expensive. The form of organization proposed has been designed to meet these conditions and retain the general proportion of Nucleal and Supplemental Classes.

Let there be one battalion of 3 4-gun batteries in peace to each 1½ regiments of infantry, one of the batteries to be manned by the Nucleal and Supplemental Classes, and the other two to contain only the Reserve Class; the active battery of each battalion to be expanded to one 6-gun or two 4-gun batteries, to correspond to the formation of the first regiment of infantry; to the complete battalion of three 4-gun batteries, to correspond to the formation of the second regiments; and to three 6-gun batteries, to correspond to a greater increase of the infantry. This latter expansion might well be made after the 4-gun batteries had taken the field, by the addition of a platoon to each. Let three such battalions be stationed at a single post, under the command of a major, and let the post be furnished with one complete set of battery horses, to be used for instruction by the three active batteries in turn. Let each of these batteries have 1 captain, 1 first sergeant, 1 musician, and 1 section of the Nucleal Class, and 3 lieutenants, 1 guidon, 1 musician, and 3 sections of the Supplemental Class, and assign the Reserve Class to the two skeleton batteries of the battalion; and let there be at the post one set of battery non-commissioned staff and artificers of the Nucleal Class and two sets of the Supplemen-

tal Class. Then, on expansion of the second or third degree, the major would come into general artillery command, the captains into command of 3-battery battalions, the batteries of which would be commanded by Nucleal and Supplemental or Reserve lieutenants, and the chiefs of section and gunners would be drawn from those grades in the three classes. This would provide for an expanded force in which each officer and non-commissioned officer would be familiar with his duties so far as they could be set forth on the drill ground, and it should on mobilization be at once moved to some place where it could be given real field manœuvres and target practice until called to take the field.

For the horse artillery a similar organization would be suitable, the horses not used for draught being furnished by their riders, as in the cavalry; or, as every horse is ridden, all might be furnished by their riders and the batteries stationed either in groups or singly. The number of batteries would be based on the number of cavalry regiments.

For the heavy artillery we have another set of special conditions, but in this case they are of such a nature as to make the general system of three classes more simply and perfectly applicable than to any other branch. Its fortifications are, with very few exceptions, located in the immediate vicinity of large cities, a favorable condition to the recruitment of the Supplemental and Reserve Classes, which, though offering less of military show to their members than the other arms, would afford quite as pleasant service in its trips to and from, and at, its afternoon drills in the fortifications, and would offer the inducement that their war service, should it be required, would be in immediate defense of their own firesides.

Let the battalions consist, as in the field artillery, of an active and two skeleton batteries, to be composed of Nucleal and Supplemental Class officers, non-commissioned officers, and privates in about the same way as the active infantry company, and the Reserve Class to be assigned to the two skeleton batteries. The numerical strength of the batteries should not necessarily be uniform, but each active battery should be assigned to the care in peace of a group of guns sufficient to require for its service in action the commissioned and non-commissioned personnel of the battalion of three batteries to which it belongs, and the number of privates adjusted to the requirements of the case, evidently less for guns manœuvred by power, for example, than for the

same guns manœuvred by hand. This method would secure for war service officers and non-commissioned officers who had been trained in time of peace in the very duties to be performed in war, a very important condition for this arm, wherein efficiency depends so largely on thorough technical instruction, and which would probably be called to repel the first hostile movement of an enemy. The duties of privates of this arm are simple and easily learned, and it is not probable that an enlistment of more than a year would be needed to properly instruct them, but the instruction of officers and non-commissioned officers should be very thorough.

This same principle of three classes could also readily be applied to engineer or pioneer and signal troops, with the variation that in these cases each company or detachment should contain all three classes.

Let us now briefly give the general characteristics of the organization for the different arms with respect to their effects on mobilization. The organization of each arm is devised so that the unit, the regiment for the infantry and cavalry and the battalion for the artillery, shall have one of its three natural divisions manned by Nucleal and Supplemental Classes and the other two used only for the assignment of the Reserve Class. It is expected that the Reserve Class will nearly, and in some cases quite, fill these skeleton divisions, so that each regiment of infantry and cavalry and each battalion of artillery in the army should have nearly or quite its complement of trained men in the proportion of one of the Nucleal Class to three of the Supplemental Class and six or eight of the Reserve Class. Mobilization, when the expansion was of the first degree, would consist of assigning the officers of all grades and distributing the men among the companies, and then filling them up so far as possible by the enlistment of trained men who had not joined the Reserve Class. It would rather be a rearrangement of material already in hand than an expansion, and could be made in a day from a plan prepared beforehand, or by the summary action of the immediate commanders. This would be the normal mobilization for the artillery. The normal mobilization for the infantry and cavalry would consist in an expansion of the second degree, which would require the enlistment of more than one-half the strength of the companies in new recruits and would require several weeks to put the regiments in form to take the field.

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Returning now to the tables of cost for pay, clothing, and subsistence under this plan, let us make a comparison in this respect with the army as at present organized. The average annual pay of the enlisted men is now something over $200.00, the clothing allowance about $40.00 and the cost of subsistence about $80.00; in all for these three items about $325.00. Supposing the proportion of the Reserve Class to the Supplemental Class under the proposed plan to be two to one, we would have $61.50 as the average cost for the enlisted men, less than one-fifth the present cost, a ratio which, owing to the large number of Supplemental and Reserve lieutenants provided by this system, would also obtain for the total force, commissioned and enlisted. This ratio, calculated for the infantry, would also apply to the heavy artillery, and including the cost of horses and forage, would also apply fairly well to the cavalry and field artillery. Assuming a uniform ratio of one-fifth we could under this plan, for the same amount as is expended for each arm at the maximum strength of the companies, troops, and batteries as now fixed, maintain a force of 60 regiments of infantry, each of 1000 enlisted strength, 36 regiments of cavalry, 840 strong, 50 4-gun batteries of field artillery, and 60 battalions of heavy artillery of 250 average strength. If we give to each regiment of cavalry the same roster of commissioned force of the Nucleal Class as heretofore proposed for the infantry, and to each 3 battalions of artillery the same, less one captain, the 60 regiments of infantry would absorb 700 officers, 36 regiments of cavalry 420 officers, and 230 batteries of artillery 274 officers, a total of 1394. But this would give a proportion of cavalry to infantry 2½ times as great as that generally assigned as the normal proportion for armies, and a proportion of field artillery, as compared with the infantry after the normal mobilization of both, only two-fifths as great as generally assigned, a condition resulting from the great demand for cavalry and little for artillery presented by the service on the plains, to which the army has heretofore been principally devoted. Taking account of the increase of the heavy artillery recently made desirable by the new fortifications, it would be proper to correct this disproportion by reducing the cavalry to 15 regiments, its normal proportion, and adding to the artillery at the rate of four battalions for each regiment of cavalry dropped, thus raising the field artillery to 40 batteries, its proper strength, and the heavy artillery to 120 battalions. The force as thus organized would then, for the same cost, consist of 60 regi-

ments of infantry, 60,000 men; 15 regiments of cavalry, 12,600 men; 40 battalions of field artillery, each of three 4-gun batteries, 480 guns, and 120 battalions of heavy artillery, 30,000 men; absorbing 700 officers of infantry, 175 of cavalry, 142 of field artillery and 427 of heavy artillery, and giving a total of 1444 Nucleal Class and about 3000 Supplemental and Reserve Class officers, and about 110,000 men, of which about one-tenth would be of the Nucleal, three-tenths of the Supplemental, and the remainder of the Reserve Class. The present force numbers 875 officers of infantry, 430 of cavalry and 274 of artillery, a total of 1580; hence such a reorganization, with the increase of the general staff made necessary by it, would just about absorb the officers at present in service; and any partial change would absorb the officers displaced.

This comparison does not include all the items of cost; as remarked before, the important one of barracks and quarters is omitted, which if included would no doubt make the showing somewhat less favorable to the proposed plan; but it serves to illustrate by its almost startling figures the great advantage in respect to cost of this system over that at present in use. The same comparison with the regular army would apply in substance to the Federal National Guard, the Active and Reserve Classes of which would be in about the same proportion and receive the same pay as the Supplemental and Reserve Classes of the 3-Class system; but the Guard system has a distinct disadvantage with respect to the other one in that it does not provide for any considerable body of regular officers and should therefore be employed only in addition to the regular army, and not as replacing it in whole or in part, as the other would do. It would be useful for increasing at a small increase of cost the force maintained by the nation as a protection against war. Both systems are fully in accord with the republican character of our form of government; the National Guard would be perhaps the more popular, but not at all certainly so, but the other would make better use of the regular army as an instructor, and would consequently secure the superior training and discipline. The 3-Class system strays further from well beaten paths, but it is believed to be nevertheless perfectly practicable.

It is hardly necessary to say more in comparison of the three systems; each speaks for itself, and the description and discussion already made have no doubt given rise to a good comparative

weighing of their relative merits and demerits in the mind of the thoughtful reader.

The conditions of the service required of the army are not yet such as to allow a complete reorganization into the 3-Class system to be made at once, nor would it be desirable to so make it were it practicable. It should first be experimented with and the change gradually made, in order that the final form of the organization might be the result of a growth that would conduct it along the most suitable lines. Let the President be authorized by law to reorganize one or more regiments of cavalry and infantry each into three regiments of the form proposed, and to similarly reorganize some battalions of heavy and field artillery; then if the result of the experiment were favorable Congress could authorize such a reorganization of the army as might seem best. The reorganization, whether partial or complete, would absorb about the same number of officers as it displaced, so that there would be no obstacle to it on that score. Similarly, the experiment of a Federal National Guard, should that system be preferred, could be tried with a few battalions, to be afterwards increased as might be desired.

It is not intended, nor is it deemed advisable, to antagonize with either of these forms the State volunteer militia organizations. The whole army could be distributed among the States in such a way as to occupy fields practically untouched by State enterprise, and it is believed that were such a reorganization to be made, each State would claim at least its proportional share, and that cities and towns would vie with each other in securing the location of a regiment within their limits. The change would give the regular army and the State organizations more in common, and it might be hoped that, instead of raising a spirit of opposition, it might create one of friendly rivalry that would not be without its good effects on both parties. Another advantage pertaining to both systems, but especially to the 3-Class, would be that regiments or battalions, once localized, would become included in the interest and attention of a member of Congress, and that many members being thus interested in the regular army, the spirit of opposition or at least neglect which arises from its being without the pale of their personal relations would cease. Still another advantage would be the localization of regiments for recruiting in war. This would no doubt tend to facilitate the obtaining of recruits, and would assist in avoiding that most ex-

pensive and ineffective of all methods of recruitment,—the raising of new regiments with inexperienced officers, while the old regiments are allowed to dwindle to mere skeletons. Says General Sherman in his memoirs: "Once organized, the regiment should be kept full by recruits, and when it becomes difficult to obtain more recruits the pay should be raised by Congress instead of tempting new men by exaggerated bounties. I believe it would have been more economical to have raised the pay of the soldier to thirty and even fifty dollars a month than to have held out the promise of three hundred and even six hundred in the form of bounty." The idea of an increase of pay for war service is well worthy of consideration.

The question of the constitutionality of such a force as the Federal National Guard and the Supplemental and Reserve Classes herein proposed is a vital one, and may seem to many to be an open one; but though it may never have received judicial decision, I think it may clearly be shown that the right of Congress to create such classes is invulnerable. The discussion of the question has been reserved to this point in order that it might be made in a clear understanding of the character of the forces in question. The constitutional provisions bearing most directly on the question are: Art. I, Section viii. "The Congress shall have power— * * * Clause 12. To raise and support armies; but no appropriation of money to that use shall be for a longer term than two years; * * * Clause 16. To provide for organizing, arming, and disciplining the militia, and for governing such part of them as may be employed in the service of the United States, reserving to the States respectively the appointment of the officers and the authority of training the militia according to the discipline prescribed by Congress;" and Section x, Clause 3, "No State shall, without the consent of Congress, * * * keep troops or ships of war in time of peace."

From Clause 12, above quoted, it appears that the power of Congress to raise and support armies is full and absolute. In the language of the U. S. Supreme Court, "its control over the subject is plenary and exclusive. It can determine, without question from any State authority, how the armies shall be raised, whether by voluntary enlistment or forced draft, the age at which the soldier shall be received, and the period for which he shall be taken, the compensation he shall be allowed and the service to which he shall be assigned."

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If then, as appears in the cases in question, the classes raised and designated as a part of the army are, not in name only, but in intent, object, and adaptation of nature to the ends for which armies are properly raised and supported, fairly component parts of the armies of the General Government, there would seem to be no room to question their constitutionality.

Clause 16 is not a limitation of the power of Congress to raise and support armies; it merely reserves to the States a certain military control over such men as the General Government may not have embodied in its armies. The plain intent of the Constitution in this matter, as judged from its language, the history of its adoption and ratification, and the state of public sentiment at the time, is that Congress should have complete, untrammeled power to raise and support armies in order to "provide for the common defense"; but that, having selected the men for and incorporated them into its armies, the remaining able-bodied inhabitants should remain under the military control of the States respectively, except that Congress might prescribe the discipline to be administered and provide for calling them out in public exigencies; the reservation of control to the States being due partly to a disinclination to delegate any unnecessary powers to the General Government and partly to a desire to reserve to the States a power to defend themselves in the event of the General Government not affording due protection. The prohibition against keeping troops in time of peace shows that it was not the intention that the States should have an independent right to wield military power even concurrently with the Federal Government. The field of jurisdiction of the States is a subordinate or residual one, over only such men as the Federal Government does not select and incorporate into its armies.

An essential portion of any military system is the provision for the theoretical or school education of its officers. This is provided for in our army by the Military Academy and the Schools of Theory and Application at Willett's Point, Fort Monroe, Fort Leavenworth, and Fort Riley. The first named is generally called a school of theory and the others of application, and perhaps with too much truth in the first allegation, as theory and application should go hand in hand in any well considered system of education. These schools accomplish their due result very well, such defects as there may be being matters of detail rather than constitution, except perhaps one serious matter connected

with the Military Academy. The difference in level between the plane of requirements for entrance, and the plane of requirements demanded for graduation, by circumstances and the reputation of the Academy and its graduates, is too great to be properly surmounted in the time allotted to it. It is not deemed practicable to increase the time of the course, and the general sentiment of the country is that the entrance plane should be kept so low as not to exclude boys who have had only the educational advantages offered by the common schools of the country. The list of subjects of the entrance examinations seems ridiculously low for an institution of which such final results are demanded, and the Academic Board has exhausted the possibilities in the way of raising the plane of requirements in exacting a thorough knowledge of those subjects.

To meet this condition and at the same time secure the advantages of the apprentice battalion before mentioned and often recommended, it would seem to be proper to establish a U. S. Military Cadet School, to be located in some central position, or perhaps to consist of two or more branches located in various sections of the country, with a course of two or three years, the ages of entrance to be perhaps from fourteen to eighteen for a three years' course or from fifteen to eighteen for a two years' course. Here would be taught the English, Latin, French, and German languages (and perhaps before long Volapuk), History, Algebra, Geometry, Trigonometry and Surveying. The school would be under a military organization and discipline similar to that at West Point, and the drill regulations would be thoroughly taught and practiced. There should be two, three or more cadets from each Congressional district and several at large. Then the staff of the school should select each year from the graduating class according to their records, a sufficient number to fill the vacancies at West Point, and the remainder should be discharged, to return to civil life with a military and academic education. This would give opportunity at West Point to complete the courses in French and German, and for less hurried and more reflective courses in other branches, and a course in tactics as distinguished from drill regulations, the lack of which has been much criticised, and which subject should be studied and practiced by every officer and therefore taught in so far as possible at West Point rather than at the service schools of application.

Our military system ought to include a plan for calling out

volunteers and organizing, training, and recruiting the regiments formed under the call. It would undoubtedly be a good plan to make use of the State machinery, through which the individuals may be reached much better than through officials of the federal government, but the wasteful method of continually forming new regiments instead of maintaining the strength of the old ones should be avoided. As General Sherman says in his memoirs: "The greatest mistake made in our Civil War was in the mode of recruitment and promotion. When a regiment became reduced by the necessary wear and tear of service, instead of being filled up at the bottom, and the vacancies among the officers filled by the best non-commissioned officers and men, the habit was to raise new regiments, with new colonels, captains, and men, leaving the old and experienced battalions to dwindle away into mere skeleton organizations. * * * I believe that five hundred new men added to an old experienced regiment were worth more than a thousand men in the form of a new regiment, for the former by association with good, experienced captains, lieutenants, and non-commissioned officers, soon became veterans, whereas the latter were generally unavailable for a year."

To meet the difficulty let the President, instead of calling on each State for so many men, call on it to furnish and maintain at full strength in the field so many regiments or battalions of infantry, cavalry, field artillery, etc. This requirement to keep the organizations full in the field would have a beneficial effect in inducing the States to send a good class of men instead of offering bounties to tempt scalawags to become "bounty-jumpers" and deserters, in order to fulfill the letter of the requisition though the spirit should not be complied with. The Department should draw up in general terms a method of procedure based on the experience of the late war, setting forth an approved and effective method of raising and maintaining these organizations. One of the fundamental principles of such a method should be the localization of regiments for raising and recruiting, based on existing political lines so far as possible, a method that would immensely facilitate recruiting for the purpose of keeping the regiments filled in the field, and each regiment should have an officer stationed within its recruiting district for the purpose of enlisting and drilling recruits and forwarding them as fast as needed. The State quotas should be raised by companies or battalions and then grouped by the State authorities into regiments according to dis-

tricts, but the colonels and lieutenant-colonels should be appointed by the federal authorities, for a full regiment is too important and independent a command to be entrusted to men selected by any other authority than the one responsible for the conduct of the war.

But little need be said in bringing this discussion to a close. In its course the intention has been to first call attention to the timeliness of a reorganization of the army at this juncture, when the reserve of trained men that we have possessed since the Rebellion is all but gone, and the army is being released from the necessity of serving on the frontier and set free to perform more fully the other duties of a peace army, to provide protection against a first attack and for a rapid and effective expansion on mobilization; then to consider what conditions and objects are required of the army organization by the title selected for the essay and the circumstances in which this country is placed; and finally, to discuss, with a view to determining in what degree they would fulfill these conditions and objects, three systems or forms of army organization which include the most practicable methods for their attainment. It is hoped that it has been made as apparent to the reader as it is to the writer, that the Three Class system, adopted as fast as the army may be released from service on the frontier, is, all things considered, the best suited to the end in view; but whether this be so or not, we shall no doubt agree in accepting as the proper guiding principle of any suitable organization the idea that has been taken for the key-note of the discussion and is expressed by the motto, also serving for the *nom-de-plume* required by the conditions under which the essay has been written, ***Ab adaptatione vis.***

THE EVOLUTION OF MODERN DRILL BOOKS.

By Captain F. N. MAUDE (Late R. E.).

THERE are certain difficulties with which the armed forces of a nation whether on land or sea have to contend, which are absolutely foreign to any other human occupations and which are rarely appreciated by civilians.

Civilian leader writers constantly compare the organization of a great railway with that of an army, and, in England at any rate, deduce from the efficiency of the former and the obvious deficiency of the latter, an argument for handing over the land forces of the Crown to a board of able civilian directors.

If the conditions were alike the deduction would be sound and incontestable—but they are not and for the following reasons :

A railway is constantly on a war footing, engaged in active operations. From daily experience in face of the enemy,—time, the public and shareholders,—every man becomes absolute master of the practical details of his daily life. A new idea in locomotives, say, can be discussed by experts, tested in practice, and its value ascertained by concrete figures. The process may be slow but only the fittest ultimately survives. In an army everything is different. To make the comparison complete, one must imagine that the railways of the world were only in fitful activity for a few months at a time, the periods of action being in each case separated by many years. Assume for instance the British North Western suddenly demobilized in the year 1854, but compelled to maintain a staff and rolling stock equal to the best in existence and capable on pain of annihilation of dealing at 48 hours' notice with the actual traffic of the present day ; obliged by financial difficulties to exercise all possible economy ; able only to run an occasional train to exercise the drivers, and limited to the experience gained by similar outbursts of activity, once in every ten years say, on other systems equally handicapped but acting under totally different circumstances of traffic to be dealt with, and distances to be traversed. Further to make the comparison complete, every driver, stoker, signalman, station-master, and even director, must know that his prospects of meeting a bloody and

often agonizing death averaged about one to four. What percentage of trains might be expected to keep their time during the first ten days of mobilization?

This much by way of apology for the apparent intellectual shortcomings soldiers are liable to and which, afterwards, when all the conditions are known, it is so easy for the average editor to point to with the finger of scornful criticism. It is also necessary as a means of explaining how it happens that false theories crop up and survive with such extraordinary tenacity in tactical schools of thought.

Imagine, under the conditions above described, the attitude of a railway manager endeavoring to glean from the accounts of frequently uneducated witnesses, colored by national prejudice and party feeling, just those points from an experiment on a continental railway best fitted for adoption on his own system. Normally it is hard enough, but under the assumed conditions it is ten times harder still. Yet that is the intellectual task which the maintenance of war efficiency sets to the commander-in-chief of modern armies, and in proportion as his own war experience is more remote and limited the task becomes harder.

No army has been placed in circumstances of greater difficulty than our own. We have had no experience of field warfare in Europe since Waterloo, and since then a change, relatively as great in the armament and organization of land forces as that which separates the old high roads and stage coaches from the flying Scotchman and the Forth bridge, has taken place.

Steam, iron and steel have not changed the conditions of land transport more thoroughly than the introduction of universal military service and breech-loaders have altered the methods of war.

When mail coaches first came into competition with Blenkinsop's locomotive and the first Stockton and Darlington railway, the old flying stage coaches still kept the road and proved superior, notably in mobility. It was the same when our old Peninsular army, the most perfect adaption of the means supplied by long service and party government, met the first rough shapings of the nation in arms idea, wielded indeed by the genius of Napoleon but hampered by the friction in its moving parts due to want of skill in their technical finish, *i. e.*, the presence of jealousies amongst the marshals and the absence of a perfected staff.

I have sometimes watched from the windows of an Indian

train, long lines of bullock carts moving along the Grand Trunk road and been struck with the parallel in our army progress.

Under European conditions the railway has long since beaten the road; in India the road often holds its own, it is cheaper and better adapted to the requirements of the country.

So it has been with our army. Long service, which is to universal service as wood to steel in construction, is adapted to the necessities of native warfare, and therefore holds its own for its special purposes; but to use it for the same purposes for which universal service exists, is like attempting to copy the cantilevers of the Forth bridge in wood, and expecting them to stand their own weight. The abstract principles of war are to practical generalship what pure mathematics are to the engineer, a knowledge of the strength of materials is indispensable to the application of either.

Bearing in mind the nature of our current every-day experiences with our old-fashioned army, the difficulties with which we had to contend on the introduction of the breech-loader will be more readily understood. The difficulties of an old stage coach manager called on to transform his property into a fully organized and efficient railway would have been as nothing in comparison, for he at least could either have studied the action of the locomotives and gear in person or have sent reliable men to collect for him the requisite data on the spot, and since these mostly deal with concrete facts which can be expressed in figures and dimensions, the information they conveyed could have been readily assimilated. Such is not the case in dealing with the activity of troops. There a reliable opinion can only be formed by men who are thoroughly acquainted not only with the technical detail of the arms in use, the least important perhaps of all factors, but with the organization, training and spirit of the troops, and they must have seen them under a sufficient variety of circumstances to be able to generalize correctly.

The duration of the campaigns of Bohemia and France was insufficient even to enable all but a few fortunate officers, specially prepared by previous training in the German army, to form opinions worthy of acceptation. It was still less sufficient for men accustomed to totally different conditions and unprepared by serious military study to arrive at any true appreciation of the values of the new factors then introduced into warfare.

I allude of course to the average military correspondent who

notoriously, with perhaps a couple of exceptions, not only had not made a special study of war, but was bound by the exigencies of his profession and by rules of common courtesy to his hosts to paint scenes of daring endurance and magnify the slaughter to increase the heroism of the troops he marched with.

Certainly now and again one or the other did speak out with a truth and directness that has hardly been appreciated, but in the main the pictures of the war with which they presented us conveyed an impression almost the precise reverse of the truth. But it was these first graphic pictures which decided the drift of English military opinion and formed the starting point for the radically false theory of tactics which for the past twenty years and more has found favor with us.

I wish it to be understood most distinctly that I do not question the good faith of the correspondents; they did their duty with exemplary courage and devotion, but as a consequence of the nature of things they could only report as they did. And for the following reasons:

It is well known that in presence of several moving objects, a man can only follow the movements of a limited number simultaneously; whether he chooses the right ones, those that give him the key to the interaction of the whole, depends on his previous training and of course on his special talent. An artist who is not a sailor may make a striking picture of a yacht under sail, but closer inspection will generally reveal that the sails are not trimmed to suit the breeze, or some vitally important part of the rigging is omitted; a favorite error is to depict two vessels on the same canvas each enjoying a breeze of its own. I once saw a charmingly animated picture of Portsmouth harbor with five separate and distinct breezes blowing simultaneously; and if, untroubled by flying bullets and screaming shell splinters, many men talented enough in their way can make such blunders, how much more may the unfortunate war correspondent be pardoned for relatively similar slips.

Let us try to realize his conditions, assuming that he has previously served in another army and is a man of iron nerve, but is witnessing for the first time the action of an arm of which his reading has taught him to expect very much. The last point is the important one in this case.

Standing somewhere about a thousand yards in rear, at which

distance a man is only distinguished as a largish dot, he sees a long line of men dash out to assault a position some 800 yards in front of them. In a moment the enemy's front is veiled in smoke, dust spurts out from the bare brown plain,—the line wavers, then presses on, leaving little black dots spotting the ground and every moment the number of these black dots increases. The supports come out, keep for a few moments their sharp outline as little oblongs, then break and dash forward to join their comrades; the little black dots continue to increase most rapidly. Presently the line checks, the supports are absorbed, and a long fire fight ensues. We need not follow it any further, but will turn to the young officer in the fighting line who smells powder for the first time, and has also been led to expect terrible things from the new weapon, but who is a brave man determined to do his duty. With the first few yards men fall,—with every step the losses increase,—at last the line breaks into a wild fire and declines to advance any further. Through the smoke he recognizes few of the faces he knows around him, and looking back sees the ground thickly encumbered with bodies; if a quarter of the section is with him that is probably the outside. The picture imprinted on his brain is ineffaceable, and hereafter he will believe, and state as a fact, that 75 per cent. of the company went down in the first five minutes. His statement will be subjectively true but objectively false. Now we must differentiate for temperaments, and note the influence they will exert on subsequent histories.

In every army there is a percentage of high strung, nervous organizations—men bent on pushing themselves to the front and exceedingly self-reliant; these are to the average officer what the hysterical radical is to the average of the members of Parliament. They will be the first on conclusion of the peace to rush into print with hasty generalizations. The nerves of the average less pushing man wore out less rapidly, and on return to the bivouac his powers of observation were not too blunted to notice that a great many men whose faces he never expected to see in this life again collected by degrees around the soup kettles. He will draw his own deductions but will probably, out of consideration for everybody's feelings (the curse of a peace trained army), keep them to himself for the time, but his judgment on the value of tactical formations will be strongly biassed for the remainder of his life.

It will be the same only more so with the officers following with the Reserve. The nervous will notice only the ground

strewn with bodies, and having his mind already biassed with legendary anecdotes of heroic endurance will hardly pause to look at the sufferers more closely, but will jump at the conclusion that they are all *bona fide* casualties. His less excitable comrade will observe more closely, but for obvious reasons will refrain from publishing the result to the world. For apart from the desire not to tarnish the reputation of the army to which he belongs, there is no particular reason why he should do so. The facts are known to seven-tenths of his comrades, and in the training of troops for battle are carefully kept in mind. It seems better on the whole for the military reputation of the country and the popularity of the service not to contradict the brilliant if inaccurate pictures of heroism common to popular books on war. And as long as the company officers—the men responsible for the drill training of the recruits—are aware of the circumstances, no apparent harm will be done by keeping silence.

The matter, however, assumes a different aspect when by promotion and lapse of years, the responsibility of the recruit training passes into other hands. Then the evil of playing with truth reasserts itself, and the older experienced men see that as a consequence of false tradition the army is being taught on a false assumption, viz., that nine-tenths of the men are heroes, and not the contrary, which is nearer the fact. In most services even then silence is preserved, the task of painting things as they are is too unpopular in itself, and the man who undertakes it exposes himself too much to the suspicion of wishing to blow his own trumpet, a suspicion peculiarly repugnant to those very natures most reliable in presence of actual personal danger. Yet with the view to check the evils the blind perpetuation of legendary national heroism inevitably entails, men,—and these, too, of the highest reputation for ability and courage,—have been found in the German army, to step into the gap and remind their juniors of what war actually is like, but they have had to pay in person for their courage and have been vilified and abused all round. Sometimes their disclosures have been made anonymously, as in the case of the *Militär Wochenblatt's* remarks anent the conduct of the Landwehr in the war, contributed as *pièces justificatives* for the new Military bill; but a few,—Meckel, Hoenig and others,—have been bold enough to append their signatures, with results hardly encouraging for those tempted to indulge in the same vein.

There is yet a third party whose views exercise a preponder-

ating influence on military history and literature, and this is formed by the general officers in command of corps, divisions and brigades. These are mostly men of fairly advanced age, 50 to 70 at least. Referring specially to the Franco-German War, it will be seen that at the time they entered the service the conditions were evidently very different to what they are now. There were no breech-loaders and out of the necessities of the case a tradition of mass training (there was no time for any other) had evolved itself. A great reaction after the strain of years of active service had set in, and almost up to the date of the 1866 campaign their military experience had been bounded by the horizon of the parade ground. Then came the introduction of the breech-loader. It is not much to be wondered at if their minds and judgments were a good deal upset by this new arm, and failing practical experience on a sufficiently large scale, each man formed his own conclusions according to temperament, either refusing to believe in the weapon at all or swallowing greedily the extremest doctrines of the inventors and peace time experimentalists.

The war itself came and shook them up. The oldest conservatives saw the Austrians fall like packs of cards before the new weapon and their confidence in their judgment was shaken; the theorists saw the confirmation of their most exalted hopes. The evidence was striking and undeniable, the new weapon was a success and attention was taken off from other factors equally powerful but less apparent.

The war was too short to bring the latter out. An ounce of practice is worth a pound of theory and the imagination of the pushing element, the Radicals of the army, ran riot.

Now it had happened that the Austrians usually attacked in heavy columns without artillery preparation and the Prussians fought in lines of skirmishers equally without artillery preparation, for the very idea of massed batteries for the moment had vanished.

The Prussian gunners and a few of the staff were quick enough to see the point, but for the bulk of the infantry, artillery was only an impediment. All they had seen and learnt was, that it was easier to halt the mass of a column than to pick off the individual skirmisher.

Matters were about in this state when the French war broke out. Having seen the effect of their own breech-loading fire there was an uncomfortable feeling in the air that the new French

rifle, ranging three times as far as their own and firing twice as fast, would be a very awkward weapon to face, and opinions were considerably divided as to the best means of doing so.

Again each man solved the problem much in accordance with his temperament and the distance at which he had seen the breech-loader in action. A few pamphlets, notably that of Captain May, had set men thinking, mostly on the wrong track; and generally the idea had taken root, that lines of skirmishers and a rapid advance to the limit of their own effective range was the best plan to adopt, on the grounds that in this way the vulnerable target was diminished.

Other factors still existed which forced the troops into this groove. In the good old days of the "Freiheits Kriege" the distances at which troops engaged and the limited range of the weapons not only enabled troops moving into action to see what was in front of them and therefore rendered them independent of cavalry, but also there was little if any cavalry to send in advance even if they wanted to. The infantry thus became self-reliant, and since, after the destruction of the old Frederician army, almost all traditional knowledge of war disappeared, it became also necessary when raising the new levies to lay down in regulations for the guidance of the willing but necessarily ignorant volunteer officers, precise directions as to distances to be observed between scouts and following bodies, and in course of time these distances, laid down for the smooth-bore only, crystalized into drill prescriptions.

Now we will return to the case the war correspondent referred to above witnessed and note what actually took place.

Along the whole extent of a position brigades were advancing towards the enemy to gain a footing for the subsequent attack.

Probably—we will make the assumption at any rate—the corps commander had no intention of closing with the enemy till all his troops were in hand and the gunners had had time to do their work, only from want of experience he had not realized at what an extreme range the Chassepôts could bite. On one flank a regiment having been duly cautioned to employ skirmishers, moves forward with two-thirds of each company in first line extended; on the other, line of company columns with a few scouts in advance is adopted.

Suddenly at 1500 yards the latter is overwhelmed with a whirring, stinging sweep of lead. Men fall fast;—through the dust

torn up by the bullets things are not clearly visible;—the following company columns, overwhelmed in the same storm meant for the preceding scouts, break to the front and in a moment the leading battalion is an extended line of individual fighters where all cohesion and order have ceased to exist. The next regiment on the flank seeing what has happened cannot leave its comrades in the lurch and presses forward, drums beating, colors flying, but similarly before the unbroken fire-power of the enemy the attempt shatters; they too dissolve into a cloud of skirmishers and then ensues a struggle of endurance. The following lines press on to reinforce the hard-pushed fighting line, but they too melt away and matters are becoming desperate, for the limit placed on the advance by the enemy's fire is still well outside the effective range of the assailants' rifles and the latter is simply being slaughtered at the enemy's mercy. Fortunately the latter becomes impatient, a bugle-call rings out, the French dash out over their trenches, but at this moment the Prussian gunners have got the range and their shells tear out wide gaps in their lines, their advance too brings them within reach of the needle-gun, and in face of the two, shells and bullets, their *élan* rapidly dies out. They turn to run, and the Prussians, the fire-pressure on their front relaxing, rise in pursuit and gain a couple of hundred yards to the front. They are now within the effective range of their own weapons and the French, disturbed in their aim by the needle-gun bullets hissing past them, to say nothing of the shells, no longer shoot with the same precision. A fresh line reaches the front, but the French also are reinforced and the fire equilibrium again restored. The French artillery, crushed by the superior accuracy of their enemy's fire, has gradually been silenced where it is not masked and now it is guns and rifles against rifles alone. Each time the French fire slackens the bravest of the Prussian line dash forward, but in doing so their own fire wanes and that of the French blazes up, and so the fight fluctuates till at length the balance of reserves in hand, the consequence of the German strategic offensive, gives the final impulse and the position is won with a last rush.

Now follow the working of the general's mind in the rear, whatever his rank. From the first moment the conduct of the fight has been taken out of his hands. Either too great preliminary extensions, or the hot-headedness of a subordinate, or a miscalculation of the enemy's range, has precipitated matters, and beyond

feeding up troops as fast as they arrived he has been powerless. As already indicated he has only the superior forethought of the staff to thank that the last closed reserve is on his side and not on his enemy's.

But the victory is won, and he must write a report. Whatever he may have thought during the crisis, it is perfectly certain that with success will come a reaction of thankfulness to the troops engaged; and even if he was aware of what was actually going on in the fighting line all the time, he will forbear to refer to it, but will only express his gratitude to his gallant troops for having saved the day,—and, his reputation.

But from these reports the official history is afterwards constructed.

The only persons who could contradict him are the coolest men who survive in the front and his confidential staff officer, and neither are likely to do so for obvious reasons; but the staff officer, who has seen more than any one else, and has presumably better education to enable him to understand the interdependence of things, will remember it all to suit his own purposes when his time arrives.

This then will be the genesis of military opinion.

The correspondent only superficially acquainted with the current of thought in the army and not specially prepared by long study to appreciate what he sees correctly will:

1st. Truthfully report what he saw.

2d. Since nothing succeeds like success, will conclude that what he saw was correct in principle, and thus:

3d. Put the cart before the horse and say that the Germans succeeded as a consequence of their adopting extended formations and not in spite of having done so.

The nervous, pushing young officer will next dash into print, and because the last men he saw who rose to go on with him were very much in extended order—for they were the survivors of the bravest and because moreover his original closed command had melted into spray before the impact of the bullets—he too will conclude that extended order is the best, indeed the only possible formation; unconsciously, but inevitably owing to the same instinct that drives him into print, his story of dangers faced will lose nothing in the telling.

Then comes the official history which speaks of the long lines rushing forward only to be swept away by the deadly hail of

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lead, the heroic endurance of the fighting line and the final rush of the whole, all of them subjectively true from the general's standpoint; and the cold prosaic figures of losses which might detract from the pictures will be supplied by another hand and thrust away in the appendix where only a few will trouble to look for them.

Meanwhile in the German army—where captains command their companies and are ruthlessly rejected if they fail to attain the prescribed standard—the common sense judgment of the cooler men, the majority, will prevail. It did prevail, and I can drop the subjunctive and describe things as they have since been happening. Within four years of the conclusion of the war the pamphleteers had faded into the obscurity from which they ought never to have emerged, and though the idea of extended, or better "individual" order, still persisted, the object sought by its retention was no longer the diminution of losses, but the attainment of the maximum fire power of the individual; and it is particularly worth noting that it was precisely amongst those regiments that had suffered most heavily that principles of rigid drill were most closely adhered to, viz., in the Guards on the Tempelhofer drill ground.

Other factors now come into play. After the war the work demanded from all officers on the active list became enormously intensified. At the first moment, when wide diversity of opinion prevailed, a few of them managed to find time for writing, but when tolerable uniformity on the drill-ground had been arrived at, there was less incentive to defend the views already practically successful, and the field of military literature passed mostly into the hands of retired officers out of touch with the men, and into those who were dissatisfied with the principles accepted by the mass of the army, and hence the literature of this period affords a false impression of current contemporary thought.

These conditions in the main still apply, though other causes have somewhat modified them. These, briefly stated, are the rise to responsible positions of the officers who were still young during the war, but had held special staff appointments which gave them a wider insight into facts as they were, or who had, as a consequence of their cooler heads and better judgment, appreciated matters more correctly. These would not have appeared in print except under pressure of necessity, and this necessity now arose.

For, as time went on and the training of the men fell into the hands of a new generation that had not seen service, the errors of the earlier writers and of the popular historians, who had painted the battle pieces in the bright and glowing colors military historians too often love to employ, began to bear their natural fruit. The psychic element in the training of the men fell into the background, and the value of "drill" as a means towards making men brave—its sole *raison d'être*—was forgotten. Two divergent schools of thought formed themselves, the one maintaining that drill was obsolete and education everything, the other the exact opposite. Both based their reasoning on practical experience, but neither succeeded in bringing all the factors into their focus. The former accepted the scenes they had witnessed or read about on the battle-fields of 1870 as the normal conditions of war due to the introduction of the breech-loader, and asserted that in face of the disintegrating effect of modern fire, close order formations were impossible, and the only salvation lay in educating the men to a higher sense of their duties and greater skill in the use of their weapons. The others, pointing to the war experience of the past, maintained that the disorder both admitted was not normal, but due to the defective discipline of the short service troops, and a consideration of the tables of losses in different wars shows that in so far they were correct. They stood out for the most rigid drill and absolute discipline, denying the possibility of making men brave by education alone.

The old Emperor, who had the most war experience of any of them, settled the matter with his customary good sense, by altering the title of a pamphlet by the Archduke Charles with the title "Drill or Education," which was sent to him for his opinion, by striking out the "or" and substituting "and," which exactly hit the nail on the head.

The truth is that the origin and purpose of "drill" has never been sufficiently inquired into. It is a process which arose on the survival of the fittest principle, and was adopted by practical men for a practical purpose, without much inquiry as to its scientific basis. Then men went to the wars every year as regularly as they now go to the manœuvres, and stayed as many months then as we now do weeks. Many things that are dark to us were to them as clear as daylight. Such soldiers as the old Dessauer, Saldern—the founder of line tactics, and Frederic the Great, did not insist on the rigid "parade" march or the lightning-like exe-

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cution of the firing exercise because these things looked well on the review ground, but because experience had taught them that they were the readiest, and indeed the only, means available to make men stand up to fire at all. They thought little of education, partly because there was no time for such things, but more because in a long service, war trained army, *esprit de corps* and practical knowledge of outpost and patrol duties disseminated themselves through the mass almost unconsciously, and became second nature to all of them. Mistakes in minor tactics were punished on the spot with death by the enemy, and it was to each man's interest in any detached party to see that his neighbor knew what he was about, as the lives of all might be imperilled by ignorance. But when it came to a great battle, and troops had to storm positions held by an enemy about equally brave, and whose heroes in the then condition of the tactics and mobility of infantry it was not possible to shake whilst at a distance, experience invariably proved that the only guarantee of success lay in the most rigid possible discipline, and that, under the then existing conditions, that discipline could only be acquired through "drill,"

It is one of the fundamental fallacies of the modern extended order school that the breech-loader has increased enormously the density or quantity of the fire to be faced. It seems such an obvious conclusion from the admitted fact that rifles load almost five times as fast now as they did then, that the point is assumed as self-evident. But as a fact it is not so. The whole history of the evolution of tactics reveals a constant struggle, on the one hand to secure the utmost possible quantity of fire per yard of front, on the other to extend the front as wide as possible without reducing the fire power below the limits fixed by experience; and the tendency has always been to utilize increased rapidity and accuracy of fire to reduce the depth and extend the front.

In Frederic's days the line stood three deep, one man to the pace, and fired six volleys a minute, or 25 bullets per yard of front, quite as many in fact as a line in single rank can get off today. Such a line was unapproachable then, even though the bullets only ranged 200 yards against 2000 now, as long as the men kept steady and held their muzzles low. That it nevertheless was frequently pierced, just as its successor will be in the future, was due to advantages inseparable from the attack which must always

obtain when the arms on both sides are equal in power, and will hold as true for bows and arrows as for the latest products of modern arsenals. But this forms a subject in itself, the only point here to notice being "equal armaments."

The amount of artillery fire to be faced by attacking troops was also greater than of later years, for an old-fashioned battery mounting a number of 18- and 24-pdrs. firing case, obviously delivered a larger number of bullets along their front, than modern 9-pdrs using the same projectile and at 19 yards interval are capable of doing. Yet again and again such batteries were carried at the point of the bayonet by disciplined troops who marched against them, initially in close formation, whatever order they may have been in at the moment of contact.

Even as recently as Sebastopol and the Indian mutiny, line was the normal formation, and though in all these cases the losses were frequently severe, exceeding those in the recent wars, no one ever asserted that good troops could not face them, but only questioned their claim to be considered good if they failed.

So far, the adherents of the "drill" school had the best of it, but they had overlooked a practical factor of immense importance.

That long-service troops inured to war will stand far heavier losses than those of the Franco-German battles is an indisputable fact, but it ceases to have much practical value when such troops no longer exist in the world.

The problem before us is, to adopt some method of fighting suited to the strength of the materials with which we have to deal. If for instance the secret of manufacturing steel were suddenly to be lost, it would be no use endeavoring to build bridges of the dimensions calculated to the tensile strength of steel when we had only wrought and cast-iron to deal with, and when bridge after bridge failed, declining to modify our practice because our forefathers succeeded before us.

Yet a change equally great in the strength of our fighting material has taken place all over the continent, and it is only the accident that it happened to synchronize with the introduction of the breech-loader that has obscured it.

Our modern armies now must be ready for action at a moment's notice; it is impossible that they can be inured to war, and there is only a limited time to train them; "drill" must therefore be cultivated with all vigor, but since drill implies the "absolute concentration of both mental and physical force on

the execution of the thing ordered," the number of hours devoted to it in a day can only be small, since no untrained men can stand more. The spare time must be devoted to the systematic education of the soldier in all those minor details which he formerly learnt from his older experienced comrades at the bivouac fire or round the guard-room chimney, and thus "drill and education" from the necessities of the case go hand in hand together: that is to say, in an army in which the true nature of the soldier's employment in war time is understood.

Even then, under ordinary peace-time conditions, it will be impossible altogether to bring men up to the "temper" of the old armies.

Hence it becomes the business of the staff in time of peace, to see to it that in war, tasks above their "tensile strength," if I may be permitted the expression, are not put before the troops; in other words, the training of the staff must be such, that if troops will only endure a loss of say 15 per cent. in advancing, they must not be called on to storm positions which may cost 30 per cent. and more.

But is this possible? it may be asked. I believe it is and for the following reasons:

Just as in mechanical construction the progress of invention has placed in our hands tools to economize human labor, so that whereas formerly the forging of a moderate-sized anchor was a maximum achievement, nowadays a twenty-ton breech-coil is worked up under a steam-hammer with comparative ease, the improvement in artillery material, particularly in the direction of mobility, gives us the power of shaking our enemy's nerves at a range, and to an extent, utterly inconceivable in Frederic the Great's days.

The shaking process cannot of course begin till the enemy's artillery has been subdued; but with equal armament and equal men the side which attacks possesses necessarily the power of concentrating against that part of its opponent's position chosen the necessary superiority of guns, and its victory in the ensuing duel is simply a matter of time, and time only.

Once the enemy's artillery is silenced it becomes simply a question of machines versus human beings; when the necessary degree of demoralization in the opposing infantry is attained, is again conditioned by time alone. It may be longer or shorter, but occur sooner or later it must.

If therefore troops are prematurely sent to the attack, and fail, as they did again and again in 1870, one of the two conditions or both must have been ignored, and this must be due either to the fact that the conditions forced the hand of the leader, or that the leader did not understand his work and committed the troops to a task beyond their strength.

"Storming a position," said Moltke, "is like fording a river; whether it is possible or not depends on its depth. If it goes over your heads you are drowned, if the fire is more than your troops can face you are lost." The analogy is perfect, only he forgot to point out that in the artillery you possess the power of reducing the depth of the river, *i. e.*, the intensity of the fire, to any degree you please, always assuming you can afford the time, which is only another way of saying that in war, time and men's lives are convertible terms up to a certain limit.

There is one special point here never to be lost sight of, viz., that only the superior leader can be the judge of when to give the order to advance, and the troops must be trained to trust their leader's judgment and obey, which is "close order discipline," and not to form their own opinions, which is "individual order."

There is, however, one aspect of the case which a system of tactics based on the above principle does not meet, and it is a consequence of the factor of "time" alluded to.

For many reasons it may not always be possible to await the moment when the guns have completed their work. Are infantry to be taught that under such circumstances the attack is impossible? I believe that it is not, but that the present opinions to the contrary simply arose from the unequal armament of the French and Germans in the last war, and from the extremely faulty battle-field reconnaisance of the German cavalry.

Examine all the cases of exceptional loss on the German side, and the first condition will always be found to have been absence of knowledge of where the enemy stood and his strength: this is particularly marked in the examples of Wedell's (30th) brigade at Vionville and the Guards at St. Privât. The second one will equally be found to have lain in the depth of the fire-swept zone to be traversed by the Germans before they could reach the outer limit of their own effective range. It is to cases like this that Moltke's saying above quoted really applies.

But assume equal armament on either side. Then the Ger-

mans would have advanced as far as their discipline would have enabled them to hold together; the first man to fall would not have stopped them, nor the second; ultimately a distance would have been attained, beyond which they could not go without replying, but from the moment their bullets began to whistle about the Frenchmen's heads, the aim of the latter would have been disturbed, and a following line would have reached the limit attained by the first with less loss, a third with less loss still, and so on till the necessary fire superiority for a further advance was attained.

It is the fundamental principle of the tactics of all ages since projectile arms came into use, that the possibility of advance beyond a certain limit, determined by the power of the weapon and the quality of the opposing troops, is a consequence of fire superiority obtained; the difference between now and formerly being that the superiority is only a momentary possession, and that whereas formerly the time required to cross the intervening space, perhaps only one hundred yards, was so short that the fire equilibrium could not perhaps be again attained, nowadays the time is so long that it may be attained and destroyed again and again, owing to the arrival of fresh troops on the defenders' side, the cessation of fire from the wavering troops, or combinations of both. This by the way explains the long undulating lines of skirmishers, the characteristic of the 1870 battle-fields as seen from the rear.

From the whole of the above, several important deductions as to the value of tactical formations follow:

1st. Whether troops can or cannot advance in close order formations (including under this head either line or company columns,—battalion and regimental columns being excluded for reasons as old as the conflict between the Roman maniple—or company column, and the Greek Phalanx—or regimental one) is entirely independent of the arms in use, but simply determined by the momentary condition of the opposing troops; and it is the business of the general commanding, as far as conditions of time allow, not to commit his men to an assault till the enemy's fire has been reduced to the necessary degree of inaccuracy to render the size of the target immaterial.

2d. The chances of a given body of troops of suitable strength carrying a given position, assuming reasonable judgment on the part of the leader, varies directly as the square of their discipline,

for the better their discipline the closer they will get to their enemy before replying and the greater the effect of their fire when they do reply. Further, the longer the time they can hold out without reinforcement and therefore the greater the distance between the following lines, if that distance attains or exceeds 400 yards, the less loss the following lines will suffer, for till they begin to reduce the distance by closing on the leading line they will be fairly out of the sweep of the "overs" meant for their comrades in front.

3d. Since on the degree of control and number of rifles delivered on the front line depends the rapidity of their fire-effect on the enemy, then in open ground (the most favorable of course for the latter's fire-effect), line two deep is on the whole the most favorable formation. Compared with a single rank of individual fighters at elbow interval, the target is only infinitesimally increased, the maintenance of discipline is facilitated and more men will reach the fire limit, for the line soon loosens, every man does not cover his front-rank man exactly, and even if he did, between 1500 and 800 yards every bullet, even of the modern weapons, does not necessarily penetrate two bodies; of course I mean the modern line of company units and not the old rigid brigade or divisional line without intervals.

Now, though I believe the line to be the best formation for the execution of the most difficult of all problems, the direct assault over a glacis-like slope, it does not follow that the training of troops should as in the old days be exclusively based on it.

The idea was shown to be fallacious even as far back as the old Peninsula days, and what the Germans are now doing is only recurring to what our old Peninsula Light Division practiced under Sir John Moore at Shornecliffe, and that they learnt from their former experiences in America.

Exclusive training in line is bad because it converts the soldier into an unthinking machine, he can only do what he has been taught, and the moment the conditions vary he is at sea.

The strength of the line lay in the concentrated will-power of its units, but the training gradually sapped the will-power of the individual and thus lowered the resultant of the mass. But the power which induces men to face danger and death in their most terrific form is the resultant power of many wills over one, and this is true of all organizations in which danger has to be faced whether in or out of the army.

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Experience has abundantly shown, at least amongst white races, that the more intelligent the unit the more readily does he absorb this collective *esprit de corps*.

Therefore the conclusion follows, adopt the principles the Germans are now employing, viz.: train your men to fight in individual order so that each man's intelligence may be developed to the utmost, and then when in the assault all order melts as it inevitably must, the man finds himself in conditions to which he has been approximately accustomed and may be therefore trusted to act for himself.

But this alone is not enough; beyond the mere education of the soldier it is necessary to teach him how to concentrate his will-power with the utmost intensity, and to give him command of his limbs and muscles. This amounts to teaching him *courage*, for between average individuals, courage more or less is only self-control, and, as doctors in charge of hysterical patients know well, self-control can be acquired by proper exercises.

It is to supply these proper exercises that "drill" exists. We do not insist on men's shouldering arms and cutting away the hands with lightning-like rapidity because by such manœuvres battles are won, but simply because the man who can do that has already acquired a considerable degree of control of his muscles by his will and is on the high road to acquire more; it is our first guarantee of steadiness in action, for us the chief consideration. The next step after training the individual is to accustom a number of men to "will in unison" so to speak, then the power of the mass asserts itself over the individual and the formation of the company or battalion is complete.

This may appear fanciful, but it is founded on ample experience. From the earliest times, almost in precise proportion as a leader has had reason to distrust his troops, he has sought to compensate for their deficiencies in small bodies by massing them in large ones, and that not because of the increased weight of the mass, which is immaterial, but simply because of the power of the will of the mass over the will of the unit; ultimately the unwieldiness of the mass has defeated its own end by attracting a fire which destroyed the will-power at too great a rate, but even Napoleon sanctioned the idea under his own eyes and we may be sure not without a clear idea of what he sought to gain.

Finally, not only the soldiers but the officers of all grades must be trained to understand that there is no such thing pos-

sible in war as a "normal formation," but each situation must be dealt with as it occurs; it being the duty of each grade in succession to carry out his orders in the way best suited to the circumstances, his training must contain nothing as to whether the movement ordered is practicable or not; that depends as above pointed out on matters of time and place which can only be understood by the officer above him who gives the order, who alone can be aware of all the circumstance and on whom rests the responsibility. Each rank below, down to the private soldier, has a certain fire-power in his hands, and his duty is to make the best possible use of it to the attainment of the object in view, and with reference to the action of his comrades around him. This obviously excludes the idea of reckless exposure, for it would be making poor use of the fire-power to get one's men, or one's self, if a private, killed without the opportunity of making use of it, when the decision whether to stand up or lie down had devolved into one's hands, a stage which is reached by each grade in succession.

It is often urged that the condition "to make the best possible use of his fire-power with reference to the action of his comrades around him" is rather a large demand on the average subaltern, but it is not really more than one asks of the foot-ball or polo-player, who plays his game always with reference to the players around him; and the difficulty that an ordinary untrained horseman (such as too many of our polo-players are) finds in controlling his pony, and which he yet learns to surmount, is certainly no greater than handling an ordinary section of bipeds on foot and keeping them in their proper position relatively to the others around him.

(*To be continued.*)

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TELEGRAPH IN WAR.*

By LIEUT. JAS. A. SWIFT, 9TH U. S. CAVALRY.

LITERALLY speaking, telegraphy signifies the art of writing at a distance, or the sending of signals from one distant point to another.

During the world's history various methods of telegraphing have been employed, all of which have depended on either sound or light as agents. The most primitive was by lighting fires at different intervals on commanding positions, and, later on, by firing cannon, the latter being considered an improvement over the former, inasmuch as its value would be the same at night as in the day-time, and the transmission of more varied information could be effected.

The semaphore system was also made use of, certain prearranged meanings being expressed by the different positions of cross-arms attached to uprights, or posts, on different hill tops.

These methods of transmitting or signalling communications, although very defective, were the best that were known until electricity, overcoming all objections, came to be used for this purpose. To illustrate the importance of the telegraph in war and all that pertains to war, is the object of this paper.

During the late civil conflict in this country the usefulness of the electric telegraph was most fully developed, and the operators and others engaged in the United States Military Telegraph Corps, whose services were so essential in connection with military operations, are justly entitled to a share of the credit conferred by Congress upon the army.

Referring to the military telegraphers in the war, General U. S. Grant in his memoirs makes this short but pointed remark: "Nothing could be more complete than the organization and discipline of this body of brave and intelligent men."

Speedy communication with all points is a matter of the greatest importance in war, and although the electric telegraph supplies the means, yet no nation is patient enough to await even this, the most speedy of all methods, for supplying the news of battle and of the forces engaged.

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* Read before Officers' Lyceum at Fort Robinson, Neb., Jan. 30, 1892.

During our Civil War the entire country was informed by telegraph of each battle fought, and of the results; and frequently as to how the battle was progressing even before either of the contending armies had won the fight or knew which side would be the winner. Many were the heroic deeds of the operators and others engaged in the telegraph service, in maintaining communication with the armies to which they were attached.

Secretary Stanton, in his annual report for 1863, says: "The military telegraph has been of inestimable value to the service, and no corps has surpassed, few have equalled, the telegraph operators in diligence and devotion to their duties."

Other means of communication were employed during the late war, among which might be mentioned the balloon, the carrier pigeon, and the flag and torch. The heliograph and telephone had not then come into use.

The English army, it is said, was the first to use field telegraphy. In the Crimean War their trenches and batteries before Sebastopol were traversed and connected by lines of telegraph. The French soon followed their example by constructing a similar system, and, later on, a cable laid across the Black Sea put the armies in the field in direct communication with London and Paris. Since then a regular telegraph corps has been organized in every European army.

It has been conceded that the success of the British in the Ashantee war was, in a great measure, due to their efficient field telegraph service, and at the battle of Sadowa, in 1866, the Germans were victorious over the Austrians owing largely to the maintenance on their part of telegraphic communication between the two main columns moving from different bases. So, during the Civil War in the United States, to the Federals and Confederates is due the practical demonstration, on the largest possible scale, of the invaluable service rendered by the telegraph. General W. T. Sherman in his memoirs says:

"The value of the magnetic telegraph in war cannot be exaggerated, as was illustrated by the perfect concert of action between the armies in Virginia and in Georgia in 1864. Hardly a day intervened when General Grant did not know the exact state of affairs with me, more than 1500 miles off as the wires ran."

It was the telegraph that enabled General Grant, from his headquarters in the field, to move his armies understandingly, as in one vast game of chess, and which brought to him dispatches

daily of the doings of his generals from all parts of the seat of war.

Never before in the history of war did one man direct so completely the several distinct armies, numbering over a quarter of a million soldiers and separated by thousands of miles, directing each day's operations by telegraph, and receiving reports at night by the same source, that his orders had been received and obeyed.

During the battle of Spottsylvania Court House, Virginia, when General Hancock was being hard pressed by superior numbers, he telegraphed to General Meade that "If the Sixth Corps does not attack at once I cannot hold the ground already gained." Meade promptly telegraphed General Warren, and in ten minutes after the dispatch was sent, the Sixth Corps did attack and Hancock held his own.

Military telegraph lines were constructed during the war over an extensive territory, embracing the District of Columbia, Pennsylvania, Ohio, Indiana, Illinois, Maryland, Delaware, Virginia, West Virginia, North Carolina, South Carolina, Louisiana, Mississippi, Alabama, Arkansas, Tennessee, Kentucky, Missouri, Kansas, and the Indian Territory, making in all 15,389 miles of line, at a cost of $3,219,400. The number of telegrams transmitted was at the rate of 3500 each day, and they varied in length from ten to a thousand or more words each, all being of an urgent or important character bearing upon military operations.

With a well-organized and equipped telegraph system there is no reason why each army corps, division, and brigade headquarters should not maintain uninterrupted telegraphic communication with the commanding general. This could be maintained even while on the march, if desired, by making a halt at stated intervals, say from 30 minutes to one hour, and making reports of any changes with the advance that might occur, or any changes in orders from headquarters to the advance or rear of the army. In each military department the wires should radiate from the centre or headquarters of the commanding general to each camp or outpost, and if either of the radiating lines should become interrupted, it would not interfere with the others. Each would be independent of the other, and telegrams passing over either of them could not be heard on the others, yet all could be connected as one circuit, if desired at any time by the central, or headquarters, office.

The entire telegraph corps, including the chief and his assist-

ants, should be practical electricians and thoroughly efficient operators. The supplies necessary for the equipment of the lines and their maintenance, should be obtainable through the Quartermaster's Department. In each military department there should be an ample supply of wire, including number 14 galvanized iron for the more permanent field lines, and insulated copper wire for the shorter, or temporary lines. Also insulators, brackets, submarine cable, instruments, battery material, poles, and tools, including reels for paying out the wire. The poles should be 17 or 20 feet in length, two inches in diameter, of light but durable timber (juniper if obtainable). The labor for putting up the line will be supplied by the troops if necessary, but it would be better to have an organized gang of laborers for this duty, so as not to draw on the troops except for such force as might be required from time to time to protect the working party. Ten miles, or even more, of field telegraph can be erected in half a day. As the army changes position the line could be taken down and the material loaded on wagons provided for the purpose, the wagons moving with the army. Insulated wire is best for short temporary lines, such as would be erected on the field during an engagement, as, in case of the line being knocked down by artillery or wagon trains, there would be less danger of interruption by contact with the earth.

The wire, whether insulated or naked, should be wound on reels, making about two hundred pounds weight of wire to each reel. Two men and one mule should be assigned to each reel, which should be attached to a pack-saddle placed upon the mule's back. This pack-saddle should be provided with a rack like a sawbuck, placed crosswise of the saddle and raised above it so that the reel, with its wire, will revolve freely as the mule moves forward.

One wagon, to be used as an office in the field, with one operator, battery, instruments, and such other material as may be necessary, should be detailed for each corps, division, or brigade, and for the commanding general. The poles should be loaded on truck wagons, fitted with standards. Each pole should be fitted with an insulator (hard rubber) at one end, the insulator being slotted so as to hold the wires up when raised.

The mules for paying out the wire should be assigned to brigades, and always kept with the command to which they are assigned. The operators should be assigned to certain headquar-

ters and never changed except in case of urgent and immediate necessity. The moment the troops go into camp, all the force connected with the telegraph service should proceed to erect the wires.

A mule loaded with a coil of wire, as previously described, should be led to the rear of the nearest flank of the brigade he belongs to, and then parallel thereto, with one man to hold the end of the wire and uncoil it as the mule is led off by the other man. This should be done in rear of each brigade at the same time, and the ends of the wires spliced, making a continuous wire in the rear of the whole army.

The men attached to brigades and divisions should all commence raising the wires at the same time. This is to be done by placing the wire in the slot of the insulator and raising the pole to a perpendicular position. In order to avoid too much slack, or sag, in the wire, it should be attached to a tree or some other permanent fixture at intervals of about every 500 yards and pulled up taut. In the absence of any permanent support two poles should be used instead, at intervals, and placed at an angle, with the tops secured together so as to hold the wire firm in its place and at the proper tension. This should invariably be done at all sharp angles, otherwise the pole will bend, or give, and cause the wire to sag too much, rendering it liable to be caught by wagons or artillery and pulled down. While the line is being put up the telegraph wagons with the operator, etc., should take their positions near where the headquarters to which they belong are to be established, the necessary connections made and the office opened for business. Thus in a few minutes longer time than it would take a mule to walk the length of its coil of wire, telegraphic communication could be effected between all the headquarters of the separate armies. Each construction party should be under the immediate supervision of a foreman. There should also be a chief operator for each separate army, who should be located at the headquarters of the commanding general. A portable battery for supplying the electric current for charging the wires was used in the field during the war, and consisted of 16 sections of six cells each. The cells were made of copper, about four inches in diameter by nine in depth, and contained a solution of sulphate of copper. In the liquid was placed a leather cup one-half of the diameter of the copper cell, and this contained a zinc plate and water, the outer, or copper cell, being the positive pole and the

zinc plate the negative pole. Each cell was insulated by a casing of thin sheet rubber, and fitted on the top with a bone rubber cap to make the cells water tight and prevent the spilling of the fluid. Each section of battery was inclosed in a strong box and the whole securely packed in an escort wagon. There was also stored in the wagon a supply of sulphate of copper and zinc plates, the only articles necessary except water, to replenish the battery and keep it in working order.

The operator's table, instruments, stationery, tools, battery, etc., were placed in one wagon, thus forming a complete outfit for working one or more lines at a moment's notice. This arrangement answered all purposes, and perhaps up to this time none better could be devised, but with the rapid and numerous improvements in telegraphic apparatus, it is difficult to predict what may be introduced in time to come.

All important telegrams concerning military movements should be in cipher to prevent disclosure in case they should fall into the hands of the enemy. The cipher key should be frequently changed. This mode of secrecy was invaluable to the government and of great advantage to military operations during the late war.

While the field telegraph affords the military commander a rapid and certain medium of communication with his base of operations and the various corps of his army, it must be remembered that it is at the same time one which is continually liable to interruption by an enterprising enemy. Wherever a military commander has to contend with an army well provided with efficient cavalry, he will find it extremely difficult to protect his telegraph lines from being destroyed by daring raids of his opponents.

There are several easy ways of making a telegraph line temporarily useless. The simplest and most obvious method is to pull down the poles and cut the wires into pieces, but when this is done the damage is easily discovered and repairs quickly made. The interruption can be made far more serious if effected in a manner which will not permit of its exact locality being known or readily discovered; for instance, such as cutting the wire and introducing a piece of gutta-percha, or some other non-conductive substance into the circuit, and then connecting the ends of the wire with it, so as to give it the appearance of the ordinary joints or splices. If, as a blind to this, a few poles were pulled down in another place and the wire cut, the probability is that the re-

pairman would not discover the principal cause of interruption until he had restored the latter and returned to his station. Here he would find that the trouble still existed and was really more perplexing than ever, and that its location could only be determined by climbing every pole or by means of tests by the galvanometer.

There are other dangers to guard against. If the enemy's cavalry get possession of a telegraph station, they can, if accompanied by an operator, easily send messages containing false information or delusive orders to well known officers of the opposing army, while the place from which they are sent and the assumed name signed to them will give the messages an appearance of authenticity which, if it does not completely deceive the recipient, will at least be the cause of considerable doubt and perplexity to him, and perhaps cause him to hesitate to accept accurate information, or authentic orders, when actually received from proper sources. These dangers should be guarded against as far as practicable by efficient patrol of the telegraph lines and by careful testing. "Tapping" the wires by operators of both the Federal and Confederate armies was not unusual. Little information was gained, however, from the cipher dispatches, but it sometimes happened that important discoveries were made as to the whereabouts or intended movements, strength, etc., of the opposing forces. General Crook, while in command in the Shenandoah Valley, Va., during the war, sent his operator to tap the Confederate telegraph wire near Shannon's Cross Roads and ascertain if possible what force was in his front. The wire was "tapped," but owing to the peculiar style of handling the telegraph key by the Federal operator, suspicion was aroused in the minds of the Confederate operators, and they declined to answer any questions. One of them, however, indiscreetly remarked that, "if that Yank don't hurry up and skip out, General *Jenkins* will get him." This indicated that it was the Confederate General Jenkins' command, the very information desired by General Crook.

During General Grierson's raid into the enemy's country from Memphis, Tenn., in December, 1863, he struck the Mobile and Ohio railroad and sent his operator with an escort of 200 troopers to tap the enemy's wire near Corinth. Important telegrams were intercepted announcing the coming of reinforcements, which information proved to be authentic and of great value to General

Grierson. During Sherman's march to the sea his operator tapped the Confederate telegraph line running to Augusta, Ga., and worked with the latter office nearly a half a day. It is believed, however, that his presence on the wire was detected, as the telegrams intercepted proved to be bogus and sent purposely to deceive. One telegram purported to be from General Longstreet to General Wheeler, at some point south, saying: "I will leave here in the morning with 10,000 men." Other messages of the same character were received. Deception, however, is a part of the art of war, and most of the prominent officers, on both sides, profited by deceptions of this nature practiced by their telegraph operators.

The most successful wire tapping of the war was accomplished by one of General Lee's Confederate operators. General Lee was anxious to learn of the purposes of General Grant. The tapping of the Fort Monroe wire was suggested. A Confederate operator with a company of picked men were chosen for the hazardous undertaking. The United States military wire was struck near Surray Court House, Va. The operator attached his instrument to the main line by means of fine silk covered wire. This he ran under the bark of the telegraph pole to the ground, thence along the ground some distance in the woods, covering the wire with leaves. Thus was the Confederate commander placed in direct communication with the War Department in Washington. For six weeks this connection was maintained, and although many telegrams were intercepted and forwarded to General Lee, only one proved of value to the Confederates, owing to the efficient cipher system used by the Federal authorities. The one message, however, was of great benefit to the enemy. It was not in cipher, and was from the quartermaster in Washington requesting that a guard be sent to meet 2400 head of cattle at Coggins' Point and convoy them to City Point for the Union army. Accordingly a strong force of Confederate cavalry was dispatched and arrived at the designated place in time to intercept the cattle and convoy them to the *Confederate camp*.

Wars, though less frequent, still occur, but the methods of conducting them are changed. If the ingenuity of man has provided weapons of offense and defense in superiority over the bow, the sling, and the shield, it has also produced means of conveying intelligence far more efficient and swifter than the runner, the voice, and the beacon.

THE ARTILLERY SERVICE IN THE WAR OF THE REBELLION. 1861-65.

By BVT. BRIG.-GEN. J. C. TIDBALL, U. S. Army.

(*Continued from* Journal *No. 61.*)

VIII. SHILOH.

HAVING, in previous papers, narrated the operations of the artillery in some of the principal campaigns of the armies of the Potomac and Cumberland, a like attention will now be given to the Army of the Tennessee.

To the three divisions,—those of C. F. Smith, McClernand, and Lew Wallace,—with which General Grant had captured Fort Donelson, were added three others,—those of Sherman, Hurlbut and Prentiss,—the whole receiving the name of the Army of the Tennessee, and constituting the right of the Federal grand army stretching from the Mississippi to the Atlantic, a distance of about one thousand miles. The left of this grand army was the Army of the Potomac, then under McClellan, operating on the waters of Chesapeake Bay against Richmond, the capital of the Southern Confederacy. The centre was the Army of the Cumberland (then called the Army of the Ohio) under Buell, operating southward through Kentucky and Tennessee.

Each of these armies had its special mission to perform; that of the Tennessee was to open the Mississippi River, a work which it virtually accomplished by the reduction of Vicksburg, the capitulation of which took place on July 4th, 1863. In the meanwhile it fought many battles, the first of which was that of Shiloh, April 6th and 7th, 1862. It is to the operations of the artillery in this battle, where it performed a remarkable and distinguished part, that this paper is to be directed.

The fall of Forts Henry and Donelson had caused the Confederates to abandon the whole of Kentucky and the greater part of Tennessee, and, on the Mississippi, to fall back from Columbus to Island No. Ten and New Madrid, and take up the line of the Charleston and Memphis railroad in northern Alabama and Mississippi, a line running east and west parallel to the front

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they now proposed to defend. This line was of the utmost importance to the Confederate cause, and all available troops were concentrated for its maintenance. The most vital point on it was Corinth, a village in the northern part of Mississippi at the intersection of the Mobile and Ohio railroad with the road just mentioned. Here were assembled, under General A. S. Johnston, the three corps of Bragg, Polk, and Hardee, with a provisional corps under Breckinridge. Beauregard was second in command, but had no specific assignment. The village of Corinth is situated twenty-one miles southwest of Pittsburg Landing on the Tennessee River, a place of steamboat freighting and debarkation for Corinth and other villages on the neighboring railroads.

The object of the campaign now undertaken by the Federal forces was to gain possession of Corinth, and thus by breaking the Confederate line, shake him loose from his hold on the Mississippi. The Tennessee River, making a long sweep through the northern part of Alabama and Mississippi and thence northward to the Ohio, afforded transportation for Grant's army to Pittsburg Landing. The movement was commenced during the first week of March. A depot was established at Savannah Landing, on the opposite side of the river, nine miles below. On the 14th Pittsburg Landing was occupied, and soon the whole army was transferred to it, except the depot still at Savannah. Buell's Army of the Ohio, then at or near Nashville, was to march overland, and uniting with the Army of the Tennessee, was to coöperate in the movement on Corinth. When everything should be in readiness, General Halleck was to leave his headquarters at St. Louis and personally assume command of the whole.

The 5th of April was the time set by Buell for his junction with Grant; he was, however, notified that he need not hurry his march, as transportation to cross the river would not be ready for him before the 8th. Nelson's division, however, arrived at Savannah on the evening of the 5th, and the other divisions of Buell's army were, under the direction of that energetic leader, making their way forward as rapidly as the miry nature of the roads would permit.

Johnston, fully informed by spies and the officiousness of disloyal citizens of every movement of the Federal armies, determined to strike Grant's army before the arrival of Buell, and set the morning of the 5th as the time for his assault; but, owing to the bad condition of the roads, and heavy rains on the 5th, his

army did not get into position for the blow until the following morning. It then consisted of the following troops actually present:

	Divisions.	Brigades.	Regiments.	Batteries.	Guns.	Strength.
Polk's Corps	2	4	16	4	.....	10,399
Bragg's Corps	2	6	28	6	.....	19,564
Hardee's Corps	1	3	18	6	.....	5,750
Breckinridge's Corps, provisional	1	3	17	5	.....	7,846
Artillery	.....	.....	.....	.....	.....	2,353
Cavalry	.....	.....	.....	.....	.....	2,932
Aggregate present for duty	6	16	79	21	118	48,844

The cavalry was attached to corps; the batteries to brigades, one to each brigade; a few had two.

Opposed to this force Grant had present for duty:

	Brigades.	Regiments.	Batteries.	Guns.	Strength.
McClernand's Division	3	12	4	24	7,029
W. H. L. Wallace's (Smith's) Division	3	15	4	24	8,708
Lew Wallace's Division	3	11	2	12	7,564
Hurlbut's Division	3	12	3	18	7,302
Sherman's Division	4	12	3	16	8,830
Prentiss's Division	2	10	2	12	5,463
Unattached	.....	2	4	22	.....
Aggregate present for duty	18	74	22	128	44,896

While Johnston had 3948 more men than Grant, the latter was superior to him in artillery by 10 pieces. Grant had about an equal number of cavalry. The two armies were, therefore, very nearly equal in fighting capacity.

The Confederate system of returns embraced a column showing the *effective* for the line of battle; this gave the actual fighting strength of his commands. The Federals, on the contrary, had no such system, but under the head of *present for duty* embraced every man, whether *effective* for the fight or not. This included teamsters, musicians, hospital attendants, cooks, and a host of others absent from the actual fighting line. This has always led to great confusion in stating the relative strength of the opposing forces of the Federal and Confederate armies. Gen-

erally the effective of the latter has been taken as synonymous with the *present for duty* of the former, thus making the Confederate force always *appear* the weaker, even when actually greater. The regiments of the two services being about equal in strength their numbers always afford a very close approximation to the relative strength of opposing forces on any occasion. In this instance Johnston had 79 and Grant 74. But Lew Wallace's Division of 11 regiments being absent from the battle of the first day left Grant with but 63 regiments against his opponent's 79. This therefore was the relative strength of the fighting force of the two armies at Shiloh on the first day—the day when most of the fighting was done.

Ten of Grant's guns were heavy pieces, standing on the bluff near the landing; the two batteries serving them had not yet received their horses. The other two unattached batteries were new arrivals, simply awaiting assignment; but were brought forward and attached to divisions during the battle. There was no artillery reserve.

The Federal cavalry, slightly less in number than the Confederate, was attached by regiments or squadrons to the divisions, an arrangement accounting in no small degree for the almost total ignorance of the enemy's movements up to the time when he came in contact with the Federal outposts.

The Army of the Tennessee was purely an army of volunteers, only two small companies of cavalry being regulars. It was furthermore essentially a western army, there being in it not a single organization from east of the Ohio River. All of the general officers were western men. The regiments were brigaded by States as far as practicable. In this connection it may be mentioned that Buell's army possessed most of these characteristics also.

Majors Ezra Taylor, 1st Illinois Light Artillery, and J. S. Cavender, 1st Missouri, were chiefs of artillery respectively of Sherman's and W. H. L. Wallace's divisions; in the other four divisions the senior battery commander was the nominal chief for his division; practically he was simply captain of his own battery and nothing more.

Colonel J. D. Webster of the 1st Illinois Artillery, in addition to his duties as Grant's chief of staff, performed those of chief of artillery for the army. For some fifteen years prior to 1854 he had been an officer of the Corps of Topographical Engineers, and

was therefore presumably somewhat familiar with artillery matters, nevertheless the batteries were of a very mixed character as regards calibre; in other respects they were in good condition, composed of excellent men, and, as a rule, well officered. Some of them had seen service at the battles of Fort Donelson, but generally they were unseasoned as to fighting. The three field officers just mentioned were the only field officers of artillery present in that army. Eight of the twenty-two batteries were *Independent* batteries, and were therefore not entitled to be represented by field officers, one of the evils attending this system of bringing batteries into service.

The country from Corinth to Pittsburg Landing is undulating, broken into hills and ravines, and wooded for the most part with oak and occasional patches of undergrowth; cultivated clearings seldom break the continuity of the forest. The Landing is on the left bank of the river; the bluffs at this point are some 100 feet above ordinary water-mark, and are cloven by a series of ravines, through one of which runs the main road to Corinth. Beyond the bluffs of the bank stretches back a kind of table-land, rolling and ridgy, cleared near the crest of the acclivity, but wooded and rough further from the river, with here and there a small cleared field. At the date of the battle two log cabins formed the only buildings in the immediate vicinity of the Landing; but about three miles out, on the Corinth road, stood a rude log chapel called Shiloh Church, which gave name to the battle.

A short distance beyond the church rise, not far from each other, two small brooks, Owl Creek, a tributary of Snake Creek, and Lick Creek, which, thence diverging, run windingly into the Tennessee, five miles apart, on either side of the Landing. On this plateau, encompassed by the river and its two tributaries, lay encamped, on the night of April 5th, 1862, five divisions of the Army of the Tennessee, with a sixth,—that of Lew Wallace,—at Crump's Landing, five miles down the river on the same side.

Sherman's Division was the most advanced; two of his brigades, those of Buckland and Hildebrand, were slightly in front of Shiloh Church, covering the main road to Corinth. His right brigade, that of McDowell, was detached a few hundred yards to the right, covering the Purdy road at its crossing of Owl Creek, while his other brigade, that of Stuart, was detached a mile or more to the left, covering the road to Hamburg, a landing about four miles above Pittsburg. Stuart occupied a hill overlooking

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Lick Creek,—not far from its confluence with the river. Sherman's Division was therefore spread out to cover the entire front, from Lick Creek on the left to Owl Creek on the right, a distance of about three miles. Subsequently Prentiss' Division of two brigades took position between Stuart and Sherman at Shiloh, but leaving an unoccupied interval of about a mile on its right. Prentiss' Division covered the Ridge road to Corinth.

Behr's 6th Indiana battery was with McDowell's Brigade on the right, with one piece detached at the crossing of Owl Creek. Barrett's battery, B, 1st Illinois, was with Buckland's Brigade on the right of the church, while Waterhouse's battery E of the same regiment was with Hildebrand's Brigade on the left of the church, the Corinth road running between the camps of the two brigades. One section (two pieces) of Waterhouse's battery were posted with a portion of Hildebrand's Brigade in advance, beyond a ravine formed by one of the branches of Owl Creek. Stuart's Brigade was without a battery.

Prentiss had with his division Munch's Minnesota and Hickenlooper's 5th Ohio batteries, the last named having arrived only the day before.

The troops just mentioned, namely, the four brigades of Sherman's division and the two of Prentiss', with their five batteries, constituted the front line of encampments—it cannot be called a line of battle, since, although covering the main roads leading towards the enemy, there was no connection between the parts, nor any of the other features characterizing such a line. Not a rifle pit was dug or a spadeful of earth thrown up to cover the troops, nor a tree felled to obstruct the approach of an enemy. At this period of the war troops had not learned the art of intrenching; it was, in fact, looked upon with disfavor, as savoring of timidity—as though afraid to meet the enemy openly in the field.

There was no system whatever in the positions of the other three divisions. McClernand had the camps of his three brigades about half a mile in rear of Sherman's position at the church, and with him were three batteries, those of Burrow, McAllister, and Nispel.

About a mile in front of the Landing and the same distance in rear of McClernand, were the camps of W. H. L. Wallace's Division, with Willard's, Richardson's and Walker's batteries. Some distance to the left of Wallace was Hurlbut's Division,

with Myer's, Ross', and Mann's batteries. Between the camps of the two divisions just named and McClernand's camp, is Brier Creek, a tributary of Snake Creek, flowing in a deep, marshy ravine, with broken and wooded bluffs on each side. This ravine played an important part in the last act of the battle of the first day, as behind it the entire army took refuge and was protected from further advance of the enemy by the artillery hastily gathered there for that purpose.

The four unattached batteries were encamped at various places not far from the Landing. These were the batteries of Margraff, Bouton, and Dresser, which, during the battle, were brought forward and served with McClernand and Sherman. Powell's battery went, in like manner, to Prentiss, leaving Madison's and Silversparre's (without horses) with their heavy guns on the bluffs near the Landing.

From the foregoing it will readily be seen that the divisions of this fine army were not encamped with a view to defense against apprehended attack; but they did fulfil Halleck's instructions to prepare for his contemplated campaign against Corinth. The work of organizing brigades and divisions was continuous, and drilling was unceasing. Everything indicated preparation only for a deliberate forward movement; not for a possible attack by the enemy. Grant had his headquarters still at Savannah, nine miles distant and on the opposite side of the river. The infantry outposts lay within a mile of the front divisions. The cavalry, broken into detachments and scattered among the divisions, was incapable of extended reconnoissance. Sherman, it is true, ever vigilant, kept his little battalion on the go, and frequently made reconnoitring expeditions some miles to the front, often encountering parties of hostile cavalry. Occasionally a regiment or even a brigade of infantry was sent out, but the positive orders of Halleck not to be drawn into a fight with any considerable force of the enemy that might bring on a general engagement, prevented any possibility of ascertaining the dispositions and intentions of the enemy. On the 3d Sherman sent out Buckland's Brigade about three miles; two companies were sent still further, both of which encountered hostile cavalry. These were the pickets of Hardee's Corps, which on that afternoon had reached this point. Next day a cavalry dash on Sherman's picket-line swooped off a lieutenant and seven men. Cavalry and infantry were sent out in pursuit, which proceeded until they came in sight of a large

body of the enemy's infantry and with it some artillery. Quite a brisk skirmish marked this enterprise. All of this was duly reported to Grant, but it was thought to be only a close reconnoissance by the enemy. On the following day, the 5th, the outposts observed many signs of the presence of the enemy, but on this day, as misfortune would have it. Sherman had no cavalry to send out. The regiment that he had, had gone to exchange with another, which latter had not yet arrived. He however strengthened his outposts and enjoined renewed vigilance on the part of the pickets. On the same day McPherson, Grant's engineer officer, made a reconnoissance towards Hamburg; and Lew Wallace sent one towards Purdy from Crump's Landing, both of which discovered the enemy in activity. Thus, in every direction, the enemy was found approaching, yet from some strange fatality Grant did not become convinced that he contemplated any serious attack.

Such was the military situation in the Federal camp on the evening of April 5th.

Turning now to the Confederate position at Corinth, we find that Johnston, instigated by Beauregard, had been quietly but earnestly preparing for an advance upon the position at Shiloh, and had waited until the last minute for the arrival of all possible reinforcements. As the attack was to be one of surprise, every precaution was taken to cover up the preparations necessary for the movement. Suddenly, on the afternoon of the 3d, Johnston put his corps in motion, with Hardee in advance, followed by Bragg, Polk, and, finally, by Breckinridge. Hardee encamped for the night about five miles from the Federal position, and here is where he was discovered by Sherman's reconnoissances, as heretofore stated. Johnston's original programme was to deploy his columns at day-break on the 5th and attack at 10 o'clock, but owing to the bad condition of the roads his columns did not all get into position until late in the afternoon of that day; Hardee, however, deployed at the proper time, but as his three brigades were not sufficient to extend from Owl Creek to Lick Creek, Gladden's Brigade of Wither's Division of Bragg's Corps was added to Hardee's right. Bragg deployed the remainder of his corps about 500 yards in rear of Hardee's line, and Polk his corps about 800 yards in rear of Bragg, while Breckinridge deployed forward upon the right of Polk. The two rear lines were to act as feeders to the first, and scarcely had the battle opened before portions of each

were hurried forward to fill up gaps here and there, wherever Hardee required assistance. Very soon the three corps had become so confusedly intermingled that commanders were at a loss to know what to command. This was a new departure in battle tactics, and so faulty as to weaken greatly the Confederate assault. About three o'clock, when the battle was at its hottest, Johnston was killed, devolving the command upon Beauregard. Just previous to this it had been arranged among the corps commanders themselves that Bragg should have charge of the right, Polk the centre and Hardee the left, independent of the commands to which the troops belonged. Breckinridge's Division had been brought around to the extreme right of the Confederate line.

So far as the Confederates had a tactical plan, it was to break the Federal left, and then, sweeping across the hills and ravines towards the Landing, drive everything down to the *cul de sac* between the river and the back waters of the overflowing Snake Creek; which plan, if successful, would have terminated then and there the field service of Grant's army, as well as the military career of that great chieftain himself.

But while the chief effort was made against the Federal left, assaults were most determinedly made all along the line; and when the battle became fully opened no troops on either side were idle —except, of course, those of both armies who, becoming dismayed at the first onslaught, sought safety by straggling, the Confederates to the woods in their rear, and the Federals to the bluffs near the river.

The attack was intended to be a surprise, and every movement was directed to that end; the Federal troops, thus taken unawares, could do nothing but strike back when the enemy struck, and soon the field became a series of bloody conflicts, so irregular as to be impossible to follow, except in a general way.

Returning now to the Federal troops, we find that about three o'clock in the morning of the 6th, three companies were sent out under Major Powell, from Peabody's Brigade of Prentiss' Division, for the purpose of picking up some of the parties of the enemy seen, the evening before, hovering about in the woods. These companies, moving forward a couple of miles to the right and front, encountered the outposts of the enemy, with whom they had a brisk skirmish, lasting perhaps an hour. In the meanwhile Colonel Moore of the 21st Missouri, also of Peabody's Brigade, was sent out with his regiment to support Powell and the

outposts. He advanced but a short distance beyond where Powell had his skirmish, before encountering a brigade of the enemy which he repulsed. The enemy, coming up in stronger force, drove back Moore's command, and followed it up with his entire line of battle, encountering the Federal outposts, which fell back fighting to the main line, and here the battle soon opened with fury.

The first shots between Powell and the enemy were fired at a quarter after five. As soon as the firing swelled into volume indicating a serious attack Prentiss formed his brigades in line and advanced a few hundred yards in front of their camps. His two batteries, those of Munch and Hickenlooper, took position on commanding ground, the former between the brigades and the latter on the right of the right brigade.

Sherman's two brigades at the church also formed line and advanced to the brow of the ravine of Owl Creek in front of his camps. Barrett's battery, better known as Taylor's battery, took position on rising ground in front of Shiloh Church. Four guns of Waterhouse's battery were a short distance to the left, between two regiments of Hildebrand's Brigade. The other two guns of Waterhouse's battery had been occupying an advanced position beyond the ravine. These with the regiment with them, fell back before an approaching skirmish line, and took position with the battery.

Sherman seeing that the enemy was advancing in force sent word to Prentiss notifying him of the fact; to McClernand asking for support to his left; and to Hurlbut, asking him to support Prentiss. McClernand sent three regiments of Raith's Brigade, which took position on Sherman's left, next to Waterhouse's battery, Hurlbut sent Veatch's Brigade of four regiments which, after great delay, took position towards Prentiss' right. These seven regiments did not fill a tithe of the interval between Sherman and Prentiss, an interval greatly broken by the ravines of Owl Creek, and dense with wooded entanglements, a place of all others most congenial to the enemy, and of which he took ample advantage to gain the flank of both Sherman and Prentiss.

The direction of the enemy's advance was such as to bring him first in contact with Sherman's left and Prentiss' right. The resistance made by the outposts of these two divisions delayed the front line of the enemy until the other two closed up on it, taking position in it wherever intervals were to be found; thus

the four brigades of Sherman and Prentiss, together with the two sent to their assistance—in all six—were confronted by ten of the enemy. The enemy was active in bringing forward his batteries, which in number of guns was quite as disproportionate as was the infantry.

It was seven o'clock when the hostile lines became fairly engaged; from now on until seven in the afternoon the battle raged without intermission, first upon one part of the field, then upon another, and, at times, at all points; in all of which the batteries had their full share, and as a rule did well their parts.

McClernand, learning that Sherman was hard pressed, moved forward his other two brigades, which he formed in line on the left of Raith, already connecting with Sherman's left. The batteries of Barrow, McAllister, and Nispel moved up with these brigades. Still more of the enemy's brigades concentrated in front of this point, and the fight became extremely fierce. McClernand was finally, about 9 A. M., compelled to give way, in which movement Barrow, having lost seventy of his horses, himself and two of his lieutenants being wounded, was obliged to abandon his battery. This giving way of McClernand uncovered Sherman's left, which was now exposed to a flank fire from the enemy, under the effect of which Sherman's left brigade,—Hildebrand's,—broke, and becoming scattered, did not again come together as an organization during the battle. Portions of it, however, attached themselves to other commands and did valuable work. Hildebrand himself, being without command, gave personal assistance to Sherman and McClernand. When this brigade gave way, four pieces of Waterhouse's battery fell into the hands of the enemy. Waterhouse was wounded.

Meanwhile Buckland's Brigade—Sherman's other brigade at the church—and Barrett's battery were withstanding assaults from several brigades of the enemy, the chief of which was from Cleburne's Brigade of six regiments and its two batteries, of Hardee's Corps. The batteries were posted on the opposite side of the ravine of Owl Creek, through the tangled morass of which the brigade struggled and endeavored to climb the wooded ascent beyond, only to be driven back again with great slaughter. Barrett's battery was conspicuous from the skill with which it was handled.

The giving way of Hildebrand exposed Buckland to an enfilade fire, and about 10 A. M. Sherman withdrew him to form a

new line along the Purdy road, about a mile in rear of his former position.

McDowell's Brigade, off towards the right guarding the crossing of Owl Creek by the Purdy road, had not yet been attacked. Sherman moved it back along the road to connect on the right with Buckland's Brigade. Captain Behr, commanding the battery with McDowell's Brigade, was killed while bringing his guns in battery, and several of the men being struck at the same time, all the rest stampeded, fleeing from the field with the caissons.

Sherman being obliged to fall back still further, three guns of this battery, thus abandoned, fell into the hands of the enemy. The gun of this battery which had been detached on outpost at the bridge was saved, and did good service in assisting the outpost companies in cutting their way through to regain the brigade.

McClernand, rallying his brigades, formed them on Sherman's left. Barrett's battery, moving back by the Corinth road, came into position with McClernand's Division. In addition to McAllister's and Nispel's batteries belonging to McClernand, Timony's unattached battery of 20-pounder Parrotts was brought up from the rear. Major Taylor, Sherman's energetic chief of artillery, brought up the unattached batteries of Margraff and Bouton, which he posted on Sherman's line.

The enemy now gathered his brigades for a fresh assault upon Sherman and McClernand, and from now until about 4 P. M. the struggle was fierce and sanguinary on this part of the field. In general features it was a succession of attacks by brigades, sometimes several brigades at a time. These being repulsed the Federal troops would follow up until they in turn were driven back. At one time McClernand's brigades surged forward half a mile or more, but meeting fresh brigades were again forced to retire. In one of these operations Timony lost his 20-pounder battery and Nispel two of his pieces. The general result of the battle was, however, a gradual retrograde movement of the Federal line, until finally, about 4 P. M., Sherman and McClernand took position behind the ravine of Brier Creek. After this, Sherman had no more fighting for this day. McClernand was vigorously assaulted by Pond's Brigade of Bragg's Corps, which he repulsed with little loss to himself but considerable to the enemy. This ended the fighting on this part of the field.

A good portion of McClernand's command had become scattered and had "disappeared." Of Sherman's Division one entire

brigade had "disappeared," except some fragments which had attached themselves to other organizations. His three remaining brigades were also greatly broken. Sherman's Division was composed entirely of raw troops. "None of them," he says, "had ever been under such a fire before, or beheld heavy columns of an enemy bearing down on them, as they did on the first day of the battle. They knew nothing of the value of combination and organization. When individual fears seized them the first impulse was to get away," a volume in a few words expressive of the difference between veterans and raw troops.

The new line taken up by Sherman and McClernand covered the bridge near the mouth of Owl Creek, over which it was momentarily expected that Lew Wallace would arrive with his division from Crump's Landing.

Grant had passed the night of the 5th at Savannah, intending to move his headquarters to Pittsburg Landing, permanently, on the morning of the 6th. Upon learning, at 6.30, of the cannonading heard in the direction of Shiloh, he immediately started by steamer for that point. In passing Crump's Landing he gave orders to Wallace to have his command in readiness to move instantly upon receipt of orders to that effect. Soon after arriving at Pittsburg, Grant dispatched an officer to Wallace, with instructions to march without delay. But by some misapprehension as to the direction, Wallace took a road which, if pursued, would have brought him far without the Federal lines. Impatient at the delay, Grant sent another officer to hasten Wallace. The latter was informed of the proper road, but in regaining it, had to countermarch his division and make a march altogether of about twelve miles. He did not arrive at Pittsburg until after dark, some time after the close of the battle for the day.

Grant arrived on the field between eight and nine o'clock. Previous to this no one had exercised control. Each division commander acted as he thought best, which in every case was to do everything possible to beat back the enemy. But the most critical part of the battle was fought without a commanding officer, causing more or less of uncertainty and delay in getting the rear divisions to the points where most needed in front.

Before leaving Savannah, Grant gave orders to Nelson, of Buell's army, to march his division up the river until opposite Pittsburg. Upon arriving at the Landing, Grant, taking in the situation at a glance, gave instructions to hasten an abundance of

ammunition to the front. The bluffs about the Landing were already thronged with fugitives from the front; these he gave instructions to have collected and organized to return to the fight; after which he proceeded to the front and, inspecting the field, gave such instructions as seemed necessary, the general tenor of which were to hold on and fight to the bitter end. This was about 10 A. M.

Turning now to the left wing, we find, as has already been stated, that the battle was opened by a portion of Peabody's Brigade of Prentiss' Division, which, very early in the morning, had been sent on reconnoissance beyond the outposts. Prentiss promptly formed line of battle with his two brigades about a quarter of a mile in front of their camps. Peabody had moved his brigade to the front to the assistance of his detachment, but being heavily pressed by greatly superior numbers was forced back into line with the left brigade. Hickenlooper's battery was on the extreme right, while Powell had his battery near the centre between the brigades.

In this position Prentiss was attacked about 7.30 by the brigades of Shafer, Gladden, and Chalmers, composed of regiments double in number to those of his command. After a gallant struggle his division, about nine o'clock, gave way and fell back through his camps, leaving behind Powell's guns and caissons and two of Hickenlooper's guns, all the horses of Hickenlooper's two guns being killed or disabled.

Hurlbut, notified by Prentiss that he required assistance, was by this time moving up with the brigades of Williams and Lauman—his other brigade, Veatch's, having been sent forward earlier—and Prentiss' regiments, drifting through Hurlbut's command, were, many of them, rallied, and were here joined by a fresh regiment just arrived by boat. With these Prentiss took position along an old, sunken, washed-out road, which the men used at first as a sort of rifle trench. Hickenlooper's remaining four guns were stationed on an elevated position to the right of this line. Prentiss was directed by Grant to hold this position at all hazards. Hurlbut formed his two brigades in line on the left of Prentiss, posting Ross' battery on the left, and Myer's on the right and somewhat advanced, so as to concentrate its fire upon some open ground in front. Mann's battery, sent at first towards the position occupied by Stuart's Brigade was withdrawn and placed in the interval between the two brigades. Thus formed, Hurlbut awaited attack, which was not long in coming.

The division of W. H. L. Wallace was encamped at the other extremity of the field from Prentiss, not far from the crossing of Snake Creek, by the Crump's Landing road. About half-past eight the division started to join Prentiss, leaving two regiments of McArthur's Brigade to guard the bridge over Snake Creek (one of his regiments had already been sent to Sherman). McArthur with his other two regiments and Wood's battery went to the assistance of Stuart, of Sherman's Division, whose brigade occupied, it will be remembered, an isolated position on the extreme left covering the Hamburg crossing of a tributary of Lick Creek. Two 20-pounder Parrotts of Welker's battery also followed in this direction. Wallace led his other two brigades to the right of Prentiss, forming a line oblique to that of the latter, and with an interval of about 200 yards between. In the salient angle thus formed were Hickenlooper's four guns. The interval was subsequently filled by the 8th Iowa infantry. Richardson's battery was at first posted between Wallace's brigades, but subsequently changed to the right, where was also Wood's battery. Welker's battery of 20-pounder Parrotts, except the two pieces near McArthur, was posted near the left and centre of Wallace's line.

The right of Wallace's line was but a short distance from McClernand's left, while there was but little interval between Hurlbut's left and McArthur's regiments operating on the right of Stuart, whose position was next the river and slightly to the left and rear of Hurlbut.

All of Grant's five divisions, present, were now in line, extending in an irregular form around from Owl Creek on the right, where the right of Sherman rested, to Lick Creek on the left, where was posted Stuart's Brigade. The ground was rolling and wooded, but quite free from underbrush, except in the ravines, many of which intersected the field in various directions. Interspersed here and there were fields, while country roads traversed the country from one place to another, but all trending more or less to the Landing. The enemy had possession of the camps of Sherman, McClernand and Prentiss, and being somewhat demoralized by their success, gave opportunity, though brief, for the formations just described.

As it was important to the enemy that the brigades of Stuart and McArthur should be got out of the way, so as to open a passage along the river towards the Landing, a strong force,

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consisting of Jackson's and Chalmers' brigades, with their batteries, together with some other troops, were sent against this position. It was now about ten o'clock, and a brisk contest ensued, which lasted nearly two hours. Several times the enemy were repulsed, but, returning, made fresh assaults, with the result that the Federal regiments, being driven back from one position to another, were finally forced to fall back to the Landing. This uncovered Hurlbut's left.

In the meanwhile a heavy attack was in progress against Hurlbut, Prentiss and Wallace, opened by the fire of several batteries, a shot from one of which blew up a caisson of Myer's battery, which, as has been stated, had been placed in an advanced position. This so stampeded the battery—officers and men alike—that they most shamefully fled, leaving everything behind. Some men from another battery spiked the guns and cut loose many of the horses. The officers of this battery were dismissed, and the enlisted men transferred to other organizations, leaving the name of the battery, the 13th Ohio, a blank in the army list of that State, which furnished so many distinguished generals and gallant troops. So far as known this was the only instance during the entire war where abject cowardice was charged to any battery.

Scarcely had Wallace formed his line before the enemy, at ten o'clock, assaulted Prentiss and, almost simultaneously, Hurlbut and Wallace. The salient in which was Hickenlooper's battery became, for a time, the chief point of attack. The enemy brought up a number of batteries to face this position, all of which were replied to most vigorously by Hickenlooper, and such other batteries as could bring their fire to bear. From this time on until 5.30 P. M. the battle raged against some part or other of the position held by Wallace, Prentiss, and Hurlbut. It was a succession of assaults by the enemy, at first by single brigades entirely inadequate in strength to the task; afterwards, by many brigades combined, which accomplished the work and eventually carried the field.

The first of these assaults was by Gladden's Brigade, of Wither's Division, against Prentiss; this was repulsed. Simultaneously with this A. P. Stewart's Brigade, of Clark's Division, was led against Wallace's front; which, being repulsed, rallied and twice again returned, until, exhausted, it withdrew from the fight. Bragg, who was commanding on this part of the field, now ordered Gibson with his brigade, of Ruggles' Division, to carry the posi-

tion. This fresh brigade charged gallantly, but the deadly fire of musketry in front, and enfilading fire from batteries, cut the ranks to pieces, and the brigade fell back discomfited. Gibson made another attempt, but with even more disastrous results.

Gladden's Brigade, having recovered after its repulse before Prentiss, now essayed an assault upon Hurlbut. This was met by Lauman's Brigade, with such a fire of musketry as to send it back. Three times it rallied and returned to the assault, but was finally put out of condition for further combat. Two brigades, Bowen's and Statham's, of Breckinridge's Division, were now pushed forward. After a series of efforts by these, Hurlbut's regiments began, gradually, to retire; a portion of them, turning upon Statham, broke his brigade and caused it to fall back. In endeavoring to rally and bring back one of Statham's regiments, Johnston, the Confederate commander, received a fatal shot. The command of his army now devolved upon Beauregard, who was at this time superintending operations against McClernand and Sherman.

Bragg now assumed entire charge of the troops on this wing, which consisted in most part of two brigades of Wither's Division of his own corps; two of Cheatham's Division of Polk's Corps, and two of Breckinridge's reserve corps, together with some eleven batteries. These he assembled for a general advance. Hurlbut, seeing these preparations, made dispositions accordingly. Wood's battery, which had been with McArthur, was posted on the Hamburg road, and near by were two 20-pounder Parrotts of Welker's battery. About half-past three Bragg moved forward. The artillery, aided by the infantry fire of Hurlbut's Division, checked the first impulse, and brought Bragg's line to a halt. Hurlbut, deeming further effort to hold his position useless, now gave orders to retire; first giving notice to Prentiss. About half a mile to the rear he attempted to make another stand, but the attempt was ineffectual. He fell back beyond his camp to the bluffs near the Landing. In this retrograde movement one of the 20-pounders before mentioned was abandoned, but recovered shortly afterwards. Ross, in passing a marshy ravine, lost his entire battery.

Hurlbut out of the way, Bragg now directed his force against the flank and rear of Prentiss. While all of this was transpiring on the Confederate right, Beauregard, Polk and Hardee were giving their attention to McClernand and Sherman on the Federal right.

It has already been stated that by 4.30 McClernand and Sherman had been forced back across the ravine of Brier Creek, to the plateau near the Landing. Some of the troops that had been operating against them were now available for service against Wallace and Prentiss, who with their four greatly depleted brigades were still holding their ground. The brigades of Russell, Trabue, and B. R. Johnson, together with such other troops as could be collected from Polk's Corps, were now brought against Wallace's flank and rear, and presently united with those of Bragg from the other direction, thus completely surrounding Prentiss, and a portion of Wallace's command. Prentiss had swung back until his line was almost parallel to that of Wallace; thus they were, back to back about 150 yards apart, fighting in opposite directions. Wallace now gave the order for his regiments to cut their way out. Tuttle's Brigade, facing to the rear, led the way, but several regiments, while covering the withdrawal of the batteries, became so hemmed in that it was impossible to escape. All of the batteries got out without much loss. Hickenlooper joined Sherman on the extreme right. About this time Wallace was killed, and what was left of his command devolved on Tuttle. Groups and squads of Prentiss' men succeeded in making their way out before the circle was closed. Prentiss with the remaining fragments of the two divisions, made a desperate struggle, but further resistance being hopeless and useless, he surrendered—himself and about 2200 men. This was about 5.30 P. M.

The troops that got away lost no time in getting back to the bluffs at the landing, where Grant's entire army was now forced into a space little greater than one square mile, with an unbridged river in rear and a victorious and exultant enemy in front. Lew Wallace's Division had not arrived from Crump's Landing, Nelson's Division was still on the opposite side of the river on its way up from Savannah, and the other divisions of Buell's army back miles away on the miry road behind it. The stragglers seeking shelter about the bluffs along the river constituted a large percentage of Grant's army. These were variously estimated at from seven to ten thousand; no more, however, than those of Beauregard's army, in which, according to Confederate accounts, the straggling was even greater, the difference between the two cases being that Grant's fighting line was driven back upon its stragglers, enclosed by the river, where they were more

noticeable, while those from Beauregard's line drifted back out of sight in the forest, and had no demoralizing influence over the enthusiasm of his more resolute troops.

The divisions of Prentiss and W. H. L. Wallace were so broken and scattered that not a brigade of either remained intact in organization. One of Sherman's brigades was dispersed entirely, while two others were greatly scattered. Hurlbut's and McClernand's divisions were the only two out of the whole five that were holding together in anything like entire organization, and these, too, were fearfully depleted by the casualties of battle and by straggling. To even the most sanguine the situation appeared almost hopeless. But here, when scarcely a ray of hope was left, one factor of battle developed to save the day.

It has before been mentioned that, standing on the bluffs near the Landing, were a number of heavy guns, intended for the siege of Corinth. Ten of these were in charge of the companies of Madison and Silversparre, but were without horses. Colonel J. D. Webster, Grant's chief of staff and acting chief of artillery, had the presence of mind to cause these to be placed in a firing position on commanding ground a half mile or so from the Landing.

These batteries formed the nucleus for a line of artillery that closed across the entire front of the position into which the army was now being huddled. As batteries and parts of batteries came back from the front they took position on this new line.

Immediately above the Landing a wide and deep ravine opens from the river. For some distance back from the river its bottom was filled with backwater and was impassable; half a mile back it was still deep, abrupt, and marshy, though passable for infantry. Here the heavy guns were posted. Further around were the ravines of Brier Creek, which empties into Snake Creek. Behind these ravines the other batteries took position, thus covering the entire front with a line of artillery of some eighty pieces. Nelson, of Buell's army, arriving at this time, says: "I found a semicircle of artillery, totally unsupported by infantry, whose fire was the only check to the audacious approach of the enemy." Grant, however, had about 15,000 organized men behind this line which, if necessity had demanded, would have given it ample support.

When Sherman and McClernand first retired behind Briar Creek, the enemy made some vigorous attempts to reach them,

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but were easily repulsed. After that most of their assailants were moved to their right to assist in giving the *coup de grace* to Wallace, Prentiss, and Hurlbut. This having been accomplished, Bragg pushed forward the divisions of Ruggles and Withers and such other troops as were available or at hand, with a view to further crushing the left and thus completing the victory.

Bragg says:—"The prisoners," meaning those captured with Prentiss, "were dispatched to the rear, under proper guard, all else being left on the field that we might press our advantage. The enemy had fallen back in much confusion, and was crowded in unorganized masses on the river bank, vainly striving to cross. They were covered by a battery of heavy guns, well served, and their two gunboats, which now poured a heavy fire upon our supposed positions, for they were entirely hid by the forest. Their fire, though terrific in sound and producing some consternation at first, did us no damage, as the shells all passed over and exploded far beyond our position."

Polk, who coöperated with Bragg in the operations that led to the capture of Prentiss, and joined with him in the further advance upon Grant's left, says:—"The field was now clear; the rest of the forces of the enemy were driven to the river and under its bank. We had one hour or more of daylight still left; were within from 150 to 400 yards of the enemy's position, and nothing seemed wanting to complete the most brilliant victory of the war but to press forward and make a vigorous assault on the demoralized remnant of his force.

"At this juncture his gunboats dropped down the river, near the Landing, where his troops were collected, and opened a tremendous cannonade of shot and shell over the bank in the direction from where our forces were approaching. The height of the plain on which we were, above the level of the water, was about 100 feet, so that it was necessary to give great elevation to his guns to enable him to fire over the bank. The consequence was that the shot could take effect only at points remote from the river's edge. They were comparatively harmless to our troops nearest the bank, and became increasingly so as we drew nearer the enemy and placed him between us and his boats." Some of the Confederate brigade commanders near the river, however, mentioned in their reports that the fire of the gunboats did prove annoying to their men, who were caused to shelter themselves in ravines to avoid accident.

But as Bragg's brigades arrived in front of the batteries posted by Webster, they were met by such a fire as to cause them to recoil. The batteries they brought up were no match for the heavier pieces opposed to them. Hurlbut, who had collected what he could of his own division, together with fragments from other commands, to the number of some 4500 men, and posted them in support of the batteries, says :—" In a short time the enemy appeared on the crest of the ridge, but were cut to pieces by the steady, murderous fire of the artillery. Generals Sherman's and McClernand's artillery was rapidly engaged, and after an artillery contest of some duration the enemy fell back."

Beauregard, made aware of this formidable line of artillery, gave orders for his troops to draw off. In his report he does not, however, admit his inability to have carried Grant's last position. He adroitly seeks for explanation elsewhere, chief among which was that his troops were exhausted and hungry. A few paragraphs before he boasted of the abundance they had found in the captured camps. He gives as a further reason that Grant's army had taken shelter under the fire of the gunboats, which at that period of the war was the great Confederate bugbear, and sufficient, as Beauregard evidently thought, to cover up his true reason for withdrawing. He knew, as well as Bragg and Polk did, of their inability, under the circumstances, to inflict damage on his troops had he continued the assault. The truth is Beauregard saw in this well posted line of artillery an obstacle so formidable that he was not willing to jeopardize the prestige of victory already gained, by an attack which must almost inevitably prove disastrous.

Whether he intended simply to withdraw for the night or for final retreat, matters not; time was gained for the arrival of Buell, and this turned the scale in favor of Grant. It was quite dark before the whole of Beauregard's troops could be withdrawn, and he left it to the discretion of his different commanders to select places of bivouac for their troops for the night; and they generally dropped down where it was most convenient. A large portion of them found shelter from the pouring rain that set in during the night, in the camps they had captured during the day. Johnston's faulty method of forming his three corps into lines, one in rear of the other, the front one to be fed by detachments from the two in rear, had produced inextricable confusion, and commingling of commands. Beauregard therefore had no line of bat-

tle, and was little prepared for the serious work thrust upon him early the following morning.

Grant's army passed the rainy and uncomfortable night in bivouac behind the ravines of Briar Creek, and the line of artillery. Sherman was on the extreme right, resting on Snake Creek. McClernand was next to him, and Hurlbut next to McClernand, resting his left near the heavy guns. The fragments of the divisions of W. H. L. Wallace and Prentiss were scattered promiscuously. Wallace had been killed and Prentice captured, leaving their commands to the senior colonels, not yet familiar with the surroundings.

Lew Wallace arrived from Crump's Landing as dark was setting in, and posted his division in rear of Sherman. Just as the battle was closing in front of the heavy guns, the leading regiment of Nelson's Division of Buell's army disembarked at the Landing, and, pushing out to the front, exchanged several volleys with the enemy. But neither the arrival of Nelson's Division, which until the next day Beauregard thought to be two days' march distant, nor that of Lew Wallace, which he thought had been in the fight and was part of the troops driven back, had anything to do with Beauregard's withdrawal. It was due to that judiciously established line of artillery and to nothing else. When all seemed lost, this line arose as a shield against further disaster.

In studying the official reports of this battle we cannot avoid admiring the enterprising manner in which the batteries of the enemy were brought into action—often with the utmost audacity —and the skill with which they were served. These were met by the Federal batteries, equally well served, and as skillfully handled.

A large portion of the Federal infantry was unseasoned to battle, nevertheless there was scarcely a battle of the war where, as a whole, it exhibited better fighting qualities, and this notwithstanding the many disadvantages that led to an undue amount of straggling, which however was no greater than that of the Confederates. The battle was fought under many disadvantages to the Federal troops, chief among which was the want of a line of battle at the time of attack. The enemy deployed his line almost within musket shot, the day before, and had nothing to do but to march forward and attack, in overwhelming numbers, Sherman and Prentiss, occupying detached positions in front of the other three divisions. During the entire day there was no connected line of

battle. The enemy, having thirty per cent. more men on the field, was enabled to concentrate a superior force, first against the Federal right wing and then against the left, using many of the same troops in both cases.

The Confederate corps organization was a great advantage, as affording commanders for both wings and the centre. Grant, having no such organization, the divisions of his wings fought without any common commander to direct their movements and efforts, and thus secure that degree of coöperation so essential on a field of this nature.

It is worthy of note that in Johnston's army, both he and his successor, Beauregard, had been educated to the military profession, as had likewise his three corps commanders, Polk, Bragg and Hardee, together with several of his division and brigade commanders; while in Grant's army there was but one, besides himself, above the rank of colonel, who had been so educated. The exception referred to was Sherman, his second ranking division commander, who, by his personal bravery, stubborn resistance, and intuitive skill, soon became the central figure on that hotly contested field.

Until the arrival of Grant, about 9 A. M., there was no one on the field exercising command of the whole, and by that time the battle had gained such headway that nothing could be done further than to strike back when struck. At all times the Confederates held the initiative, and derived full advantage from it.

The losses during this day were heavy, something like 6000 killed and wounded and 3000 missing (including the 2200 captured with Prentiss) many of whom were either killed or wounded. The Confederate loss was equally as great in killed and wounded, but not so heavy in prisoners. The Federals lost 33 pieces of artillery, most of which were recovered on the following day.

No hostile movement was made by either army during the night, but each lay, chilled and comfortless, in the pouring rain, awaiting the the events of the morning.

Second day, April 7.

It will be remembered that the leading brigade of Nelson's Division of Buell's army, arrived just at the close of the battle on the evening of the 6th. The other two brigades arrived soon afterwards, all having to be ferried in steamers across from the opposite side of the river. Crittenden's Division, of two brigades,

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arrived during the night, and early in the morning McCook's, of three brigades, began to arrive; the last brigade did not reach the landing until about 10 o'clock.

Accompanying Crittenden's Division were the batteries of Bartlett,—"G," 1st Ohio,—and Mendenhall,—"H and M," 4th U. S. Artillery. With McCook was Terrill's battery,—"H," 5th U. S. Artillery. The remainder of Buell's batteries, as likewise his cavalry, had to be left behind for want of transportation. That portion of Buell's army present, to take part in the battle, consisted of 29 regiments and the three batteries just mentioned, and may be estimated very closely at 17,000 men in line. Lew Wallace's Division, which had arrived fresh from Crump's Landing, contained about 5000 effectives. Of those that had been in the battle of the day before, about 15,000 were organized and in condition to renew the fight. In all, Grant had about 37,000 effective men, against the remnant of Beauregard's army, which now could not have been much over 20,000 men for battle.

Grant, appreciating the advantage of the initiative in battle, had determined to attack his adversary at daylight on the following morning, and, in consultation with Buell and Sherman that evening, decided that Buell with his army should attack on the left, and Grant's immediate command the right. Immediately after daylight the troops moved out. Nelson's Division, the extreme left, took position across the Hamburg road towards the river; then followed, towards the right, the divisions of Crittenden, McCook, McClernand, Sherman and Lew Wallace; the latter rested on Owl Creek. Hurlbut's Division was in support in rear of McClernand, while the fragments of Prentiss' and W. H. L. Wallace's divisions were posted by regiments or brigades as supports at various places along the line. The batteries were with their divisions.

Nelson moved forward soon after daylight and his skirmishers, striking those of the enemy, notified Beauregard that an attack was impending. Soon after this he learned that a part at least of Buell's army had arrived. He had not anticipated this, for he had been informed the day before, through his detective agents, that Buell's troops were still two days' march in rear. His scattered troops were got together as quickly as possible. The attack was entirely unexpected to him, and he was in nowise prepared for it. On his right were parts of five brigades which Withers hastily put together, and adding Chalmers' brigade and three bat-

teries, boldly confronted Nelson. A halt of an hour or so that the latter had to make to allow Crittenden and the rest of the line to come forward, was valuable time, improved by the enemy in getting into position.

When Nelson again advanced, he came upon Withers' heterogeneous force, which was driven back. Nelson, being without artillery, applied to Buell, who sent him Mendenhall. The latter placed his battery in the interval between Nelson and Crittenden, and at once engaged the batteries of the enemy. After about half an hour the latter ceased firing, but soon after reopened, accompanied by musketry. "I immediately answered," says Mendenhall, "and in a very short time his fire again ceased." Presently the enemy reopened from the battery towards Mendenhall's left, and also from the one towards his right. Separating slightly his sections, he replied to them both, the fire from which soon ceased; but only for a short period, when it was again resumed and again silenced. Half an hour later the enemy opened with a battery on Mendenhall's right, to meet which he changed front, and opened with case shot and canister on infantry advancing from the same direction. The infantry was repulsed, and falling back, the enemy's battery again opened. The enemy now advanced on his, the enemy's, right, and for a period Mendenhall was exposed to an enfilade as well as a direct fire. He now changed the direction of his fire, and opened with canister on the infantry approaching on the left. The latter being repulsed, he again directed his attention to the battery in his front, the fire of which he soon silenced.

In the meanwhile Hazen's brigade advancing, captured the central battery which Mendenhall had silenced. But Hazen, not being supported either on the right or left, was exposed to a terrific fire on both flanks and front, and was forced to retire with a loss of more than half that of the whole of Nelson's Division during the entire day. By this time Crittenden was greatly retarded in his forward movement by a battery in his front. Mendenhall being sent for, soon so crippled this battery that it was not able to get away when the infantry advanced. He then moved forward, and occupying its position, continued firing upon the enemy until the latter disappeared from the field. Nelson in his report states that Mendenhall's battery gave his division "most refreshing relief." There were but few instances during the war where any battery was more efficiently handled than this by Mendenhall.

Hazen's Brigade being knocked to pieces, Ammen's, the one on its left, was unsupported on both flanks, and being heavily pressed was in danger of being broken. Nelson again applied for artillery, and Buell sent him Terrill's battery H, 5th U. S. Artillery, which at that time, 9 o'clock, had just landed. Hurrying to the support of Ammen, the enemy was repulsed. Following the retreating enemy in company with Ammen's skirmish line, Terrill took position on a ridge in front, from which he could obtain a better fire on the enemy's batteries to the right. The enemy, being reinforced, now advanced, driving back the skirmish line, and Terrill was obliged to fall back, firing with prolonge fixed. In this manner he kept back the advancing line of the enemy until Colonel Tuttle brought around to the assistance of Ammen a portion of what was left of W. H. L. Wallace's Division from the battle of the day before. Tuttle sent forward a couple of regiments to the support of Terrill, and the Confederate line retired to its former position in the timber. Ammen's line, which had fallen back under the galling fire evoked by Terrill's battery, now returned and occupied the ridge with Terrill.

It was now nearly two o'clock, and the enemy having withdrawn from Nelson's front, Terrill advanced his battery until he got an enfilading fire on the enemy with whom Crittenden's and McCook's divisions were heavily engaged. He gave special attention to a couple of the enemy's batteries retarding McCook's advance. Sending one section (two pieces) still further ahead, he obtained a reverse fire which soon caused the opposing batteries to retire. Thus relieved, McCook, advancing, drove the enemy.

Nelson, in his report, speaking of Terrill says :—" This battery was a host in itself." Other commanders being likewise profuse in their praise, Terrill was rewarded with a brigadier generalcy, not, however, to command artillery, for which he had proved himself so well qualified, but to command a brigade of infantry, at the head of which he was killed a few months afterwards.

General officers were not considered necessary for the command and management of artillery; scarcely were field officers so considered until towards the close of the war. This point has been animadverted upon in previous papers of this series.

Bartlett's battery, belonging to Crittenden's Division, took position with the latter, in rear of an open field surrounded by thick woods held by the enemy. Here he did good service, until

about noon, when he withdrew to replenish his ammunition. When he returned the battle was ended.

About one o'clock Beauregard gave orders to withdraw. His line of retreat was necessarily by the main Corinth road, past Shiloh Church. Across this Beauregard established his strongest line and made his stoutest resistance, holding it as long as possible to enable his troops, from the right and left, to withdraw safely. Here, in front of McCook, McClernand and Sherman, took place the heaviest fighting of the day. McCook having no artillery, Bouton's battery was sent to him from Sherman, and those of McClernand immediately on his right gave him assistance. Lew Wallace's Division had swept up Owl Creek on the right of Sherman and using his batteries freely had driven in towards the centre all of that flank of the enemy. The fighting about Shiloh Church became intense. The enemy had here the divisions or parts of the divisions of Clarke, Cheatham and Ruggles, together with numerous odd brigades, and was well supplied with batteries. These were engaged by the batteries of Bouton, McAllister, Wood, Thompson and Thurber.

Beauregard was fighting to secure his retreat, and maintaining the struggle as long as possible was finally, about 3 P. M., obliged to fall back. He established a battery and a brigade on the rising ground south of Owl Creek, commanding the ground about Shiloh Church, and withdrew his troops behind them. Two miles beyond this, a rear-guard took position again. At Mickey's, some two miles further, Breckinridge was stationed and continued there for several days. The rest of the army passed on to Monterey, and by the end of the week all were back again in their works surrounding Corinth.

There was no pursuit of the retreating army beyond the last position taken up by him on the high ground beyond Owl Creek. The cavalry, dispersed as it was to divisions, was not organized for efficient work, and the infantry was so thoroughly fagged out by two days of incessant fighting, with an intermediate night of drenching rain, that it was contented to drop to rest in the position it held when the last shot was fired. The enemy, barely able to drag himself away, was trembling with fear lest a pursuit might be made. Bragg, on the following day, when about half way back to Corinth, reported to Beauregard: "Our condition is horrible. Troops utterly disorganized and demoralized. Roads almost impassable * * * * It is lamentable to see the state

of affairs, but I am powerless and almost exhausted. Our artillery is being left all along the road by its officers; indeed I find but few officers with their men. * * *" Others report a similar condition of affairs. Cavalry horses were sent back and recovered most of the abandoned artillery, and as fast as wagons got back to Corinth, their teams returned to assist others through the miry roads, which in consequence of constant rains had become almost, if not entirely, impracticable, and the troops, suffering from want of food and exhaustion, were unable to repair them. The rout and demoralization of this army which, less than a week before, had set out with high spirits, as Beauregard boastingly asserted, to drive Grant's army into the Tennessee River, was not excelled even by Bull Run, between which and it there were in reality many points of resemblance.

On the following day, Sherman, with as much cavalry as was at hand, and two brigades of infantry, advanced two or three miles and drove back the rear guard of the enemy, which made a brief stand; after which he returned. He could not take artillery with him on account of the impassable condition of the roads. Grant was prohibited by Halleck, still at St. Louis, from advancing any part of his command in pursuit beyond a distance from which it could not return the same day, and this virtually prevented any pursuit whatever. Everywhere Sherman saw evidences of hasty and disorganized retreat; especially in artillery material, left for want of means to drag it through the miry roads.

The divisions of McClernand, Sherman, Hurlbut and W. H. L. Wallace, reoccupied their old camps, which having been in the enemy's possession for twenty-four hours were thoroughly despoiled. Buell, now joined by Wood's Division, distributed his divisions along the front where they had fought, and thus the battle ended. Halleck arrived on the 11th, and taking charge in person, began in a methodical way to make preparations for an advance on Corinth. This was in accordance with his original plan, so rudely interfered with by the battle just described.

Beauregard expected an immediate and energetic advance, and with great promptness and spirit got up Van Dorn's and Price's troops from the Mississippi, those of Maxey and Leadbetter from Tennessee, and called in detachments from everywhere. Jeff. Davis urged the governors of adjacent states to raise as many troops as possible and send them to Beauregard without delay. In this way the muster rolls of his army soon

swelled to about 112,000 men. In reality he did not at any time have much over one-third this number present. Meanwhile, that is, on April 21st, Halleck's army was reinforced by Pope's Army of the Mississippi, summoned from the operations just begun before Fort Pillow. Thomas' Division of Buell's army arrived soon after the battle. These reinforcements together with some other detachments, gave Halleck an effective force of about 100,000 men.

The aggregate Federal loss for both days was 1735 killed, 7882 wounded and 3956 captured—making a total of 13,573. Of these 236 killed and 1728 wounded belonged to Buell's army, which army had almost none captured.

The aggregate Confederate loss for the entire battle was 1728 killed, 8012 wounded and something over 1000 captured. Many of the captured on both sides were wounded.

Although the fighting was at times very intense on the second day, the chief loss occurred on the first day, in which the number of the killed and wounded in Grant's army was a fraction over 25 per cent. of those engaged. In Beauregard's army the loss in killed and wounded was a fraction over 24 per cent.

The loss in artillery on each side was about equal. Grant lost 33 pieces on the first day, most of which were recaptured on the second; for those that were not, an equal number were captured from the enemy.

The battle of the first day was in favor of the Confederates, but the victory was prevented from being made decisive by the circle of artillery before mentioned, and this gave time for the arrival of Buell's army; after which there was scarcely a ray of hope left for Beauregard. What would have been the fate of Grant's army had Buell not arrived so opportunely is a matter of conjecture, but the probabilities are that Grant would have repulsed any attack that Beauregard could have made on him.

Halleck organized his army into the right wing, centre, left wing, and reserve. The right wing comprised all of the Army of the Tennessee (except the divisions of McClernand and Lew Wallace), together with the division of Thomas from Buell's Army of the Ohio, and was commanded by Thomas. The centre, composed of the Army of the Ohio, except Thomas' Division, was commanded by Buell. The left wing, the Army of the Mississippi, to which Gordon Granger's division of cavalry was still attached, was commanded by Pope. The reserve, under

McClernand, comprised his division and that of Lew Wallace. Grant was appointed second in command, but without any specific command or duty. No change was made affecting materially the artillery arm.

Halleck did not get ready for the march until the last day of April, and then he moved with such precaution that, although but slightly opposed, it required thirty days to make the fifteen miles intervening between his position at Shiloh and that of the enemy at Corinth. His entire army was intrenched at every halt, and all subordinate commanders were forbidden to do anything that might bring on a general engagement. The enemy's cavalry kept close in front of Halleck's army, and as he drew nearer to Corinth the enemy offered stouter resistance to his advance. Sharp skirmishes took place, but nothing amounting to an engagement. In the meanwhile Beauregard, having sent away all valuable stores, the sick and his heavy artillery, issued detailed instructions for the evacuation to take place at three o'clock on the morning of the 30th. At six o'clock explosions and clouds of smoke notified Halleck that Beauregard was leaving, and by eight some of the Federal troops entered the place. Pope, with a portion of his own army and a couple of divisions from the Army of the Tennessee pursued some thirty miles discovering that Beauregard had taken position a few miles further on in an inaccessible locality behind swamp and jungle. Upon the approach of Pope, Beauregard continued his retreat to Tupelo and the pursuing force returned to Corinth.

Several days before reaching Corinth, Halleck had dispatched Colonel Elliot with two regiments of cavalry to make a circuit around Corinth and strike the railroad forty miles in its rear, doing all practicable destruction to it. This expedition was eminently succcessful. Elliot, striking the road at Boonville before daylight on the 30th, destroyed a train loaded with ordnance stores, artillery and ammunition, besides so thoroughly destroying the road as to prevent its being of further use in the evacuation. Sheridan commanded one of these cavalry regiments, having been assigned to it the day before, and it was upon this occasion that he received his first lesson in bold cavalry raiding.

The possession of Corinth by the Federal troops was of great strategic importance, but the victory was barren in every other particular. It was nearly bloodless. A fine opportunity was lost for giving the enemy a stunning blow.

Halleck at once began to break up his fine army, sending it by detachments to guard and repair railroads. Pope being called to the East to commence his Virginia campaign against Lee, his Army of the Mississippi was distributed to Grant and Buell. Thomas' Division was returned to Buell, and that entire army was turned eastward along the Memphis and Charleston railroad to march to Chattanooga. Buell had instructions to repair and keep open the road as he proceeded, a work which caused such delay that Bragg was enabled, by sending his troops by rail around by the way of Mobile, to reach Chattanooga before him. From this point Bragg boldly assumed the offensive, moving straight for Nashville and Louisville and compelling Buell to fall back to the Ohio River at Louisville, where he arrived ahead of his antagonist, and here commenced the campaign embracing the two important battles of Stone's River and Chickamauga, treated of in previous papers of this series.

Halleck was called to Washington to assume the duties of General-in-chief. Grant was restored to command, but it was some time before he could re-collect his scattered army—the Army of the Tennessee—for effective work.

Bragg had succeeded Beauregard, who was sent East. Upon starting for Chattanooga Bragg left Van Dorn, who being joined by Price from west of the Mississippi, had an active force of about 40,000 infantry, amply supplied with an enterprising cavalry, constantly interrupting Grant's lines of communication.

The Army of the Tennessee was not again brought together as a whole until the Vicksburg campaign of the following year, by which time it was organized into four army corps, the 13th, 15th, 16th and 17th, commanded respectively by McClernand, Sherman, Washburn, and McPherson. It then consisted of 14 divisions and 40 batteries, with a good supply of cavalry. The batteries were still attached to divisions. Incredible as it may seem there were but three field officers—majors—with all of this artillery. None of those of the artillery who had fought so gallantly at Shiloh and other places had been promoted: in the meanwhile promotion among their comrades in other branches had been active.

The great work assigned to the Army of the Tennessee was the opening of the Mississippi, that it might run unvexed to the sea. This work it accomplished by the capture of Vicksburg, which capitulated on the Fourth of July of the following year, 1863.

XUM

After this a portion of it was sent to the relief of the Army of the Cumberland, now, after the battle of Chickamauga, beleaguered by Bragg in Chattanooga.

In the spring of the following year, 1864, the Army of the Tennessee, now commanded by McPherson, was united with that of the Cumberland, now under Thomas, and the small Army of the Ohio under Schofield, for the Atlanta campaign by Sherman. General Barry was appointed Chief of Artillery for these combined armies, to the artillery of each of which he gave a battalion organization. The batteries of each corps were united into a brigade as a distinct command, in place of the division and brigade assignments heretofore existing in these armies. Thus organized, a greater degree of efficiency was secured, and a less amount of artillery required to perform the same amount of effective work.

Soon after the capture of Atlanta, September 2, 1864, Sherman, sending Thomas, with the Army of the Ohio and part of that of the Cumberland, to destroy Hood, now in his rear, organized the remainder of his force, consisting chiefly of the Army of the Tennessee, for his "March to the Sea." Having accomplished this march, Sherman turned from Savannah northward, in pursuit of an army that "Jo" Johnston had collected to retard his movements. This army he forced to capitulate at Durham, North Carolina, April 26, 1865, being one of the closing acts of the Great Rebellion. From Durham the Army of the Tennessee was marched to Washington, where it was mustered out of service. A large portion of the artillery with which it had made the Atlanta and other campaigns, accompanied it in these marches through Georgia and the Carolinas.

The Army of the Tennessee is remarkable for having been the chief factor in the capture of three Confederate armies, viz.: at Fort Donelson, Vicksburg, and, lastly, the one just mentioned at Durham.*

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*In my Artillery article in the January number of the JOURNAL (No. LXI.), p. 26, alluding to the perilous condition for food of Rosecrans' army after the battle of Chickamauga, I say—"This state of things continued about a month, until the arrival of Sherman with the Army of the Tennessee, when communication was reopened."

My attention has been called to the fact that the first troops to arrive and open communication and give relief to the beleagured army were the Eleventh and Twelfth Corps, under Hooker, from the Army of the Potomac. These corps, after a severe and successful engagement with Longstreet's troops at Wanhatchie, took possession of Lookout Valley and opened communication with Rosecrans' army some days previous to the arrival of Sherman with part of the Army of the Tennessee. J. C. T.

Comment and Criticism.

(The remarks under this head have, generally, been invited by the Publication Committee, which desires that, as far as practicable, these "Comments" should appear under authors' names.)

I.

"The Place of the Medical Department in the Army."

Col. Thomas M. Anderson, 14th U. S. Infantry.

THE Line has as great an interest in the efficiency of the staff departments as the members of those departments have themselves. Therefore any comments we may make upon them should not be made in a spirit of captiousness, but to bring about a better understanding as to our coördinate work and duties.

A clear understanding of our mutual limitations is particularly desirable in our relations with the Medical Department. We are in constant touch with its members. Our health, efficiency and at times our lives are in their keeping. A good doctor is an inestimable advantage, just as a poor one is an unmitigated misfortune. Officers have been put to great expense and trouble in cases where they thought that they could not trust to the skill of the medical officers who happened to be stationed with them. On the other hand thousands of dollars have been saved to us, and assistance given which cannot be estimated in money, by the skill, kindness and devotion of army doctors.

In commenting on Lieut. Williams' article on the "Place of the Medical Department in the Army," we should not do so from a merely technical standpoint. Yet it does seem that the authorities he cites establish his thesis that army doctors have only assimilated military rank and that they should not be given military titles. He might have quoted from their commissions to show that in them the wording of the law is followed, in stating that A. B. is appointed a Surgeon with the rank of Major, and that he shall be obeyed (not as a Major) but as a Surgeon. Really it is a matter of small consequence, what rank or title is given to members of the Medical Department. The important question for them and us is, whether giving them military duties and authority is a detriment or advantage.

The lawyers have a saying that Themis is a jealous mistress. I have forgotten the name of the pagan divinity who feeds the snake and inspires the pill givers, but she is even more exacting. She tolerates no divided allegiance. To drop antique comparisons, we may safely assert that the science of Medicine is so complex, that we may well mistrust those who, having undertaken the grave responsibilities of its practice, waste their time in asserting claims to military titles and authority. The principles of the two professions are antithetical. It is our business to kill, it is theirs to cure. They should be with us but not of us. One of their values to us is, that they view things from a different standpoint. The trouble with the Medical Department, is that the army is so healthy that they have not enough work of a strictly professional character. Just now they are running to statistics and philanthropy. We cannot blame them. They are only doing what some of the other Departments are doing—making work.

Any business man of first class executive ability could do all the administrative work of the army with one fifth of the number of men and at one third of the expense. But this would ruin the service. It would work well enough in peace, yet leave us unprepared for war. Our staff system is organized to meet that emergency. We are bound to keep all parts of the machine in running order. As our government is one of balanced powers, so in our army we should have a balance and coöperation of Departments. The important thing for us is to keep them distinctly separate in function yet under proper coördination of control.

I am inclined to think, that as a choice of evils, we could better afford to lose our line regiments than our staff organization. We might possibly get along, like the Swiss, with a permanent Staff and a well drilled militia. This is an experiment which it is to be hoped we may never have to make. It is not the use, but the abuses of the staff bureaus that line officers object to. We would like to see them all perfect in their way.

We would like, first of all, to see our Medical Department abreast of the most advanced science of the day. It is surprising to meet medical men ashamed of their title of "Doctor." "Doctor" means "Teacher." Applied to a man who can instruct us in the science of Life and the rules of living, it is a high and honorable title.

Lieutenant-Colonel Chas. R. Greenleaf, Deputy Surgeon-General U. S. Army.

"The Court knows nothing of the intention of an Act, except from the words in which it is expressed applied to the facts existing at the time, the meaning of the law being the law itself."—(*Enderlich on the Interpretation of Statutes*, Par. 8.)

"It is a well known rule of construction that the intent of the legislature must be ascertained from the words of law; and that the words of a statute, not the unexpressed intentions of its framers, govern its construction. The thought in the minds of those who passed the law cannot be inferred. The intent must be expressed in the law itself."—(*Gilkeson's Opinions.*)

Stripped of its verbiage and historical references, this article denies to officers of the Medical Department actual rank and the titles inherent to it, and claims that whatever rank these officers may have is "assimilated" and therefore without rightful title. Assuming that this epitome of the article is correct, an examination, in accordance with the texts above quoted from statutory construction and unwritten law, of the statutes creating the Medical Department and legalizing the status of its officers, may not be without interest and possibly profit to the writer of the article and to those who think as he does.

In Sec. 1168, R. S., which details the organization of the Medical Department, the several grades from Surgeon-General to Assistant Surgeon are coupled respectively *with the rank of* Brigadier-General to 1st Lieutenant; there is no ambiguity in the wording of this statute, no such qualifying adjectives appear as "assimilated," "relative," "quasi," nor yet the more specific prefix "species of military"; only "rank" and nothing more.

Sec. 1342, defines the word "Officer" as including commissioned officers, and Sec. 1174 specifically mentions "Officers of the Medical Department." Being officers, they are entitled, under Sections 1243–1260, to retirement; and in the Sections 1256–1257, relating to rights and liabilities, and vacancies, the same unqualified notation of "rank" appears, except in one significant instance where Sec. 1254 declares that officers "shall be retired upon the *actual rank* held by them"; furthermore, in the Act of Congress approved July 27, 1892, fixing the status of certain medical officers, this language is found—unqualified and unequivocal—"those *holding the rank* of Colonel," etc. Surely, "the meaning of the law being the law itself," what status can be given a medical officer other than the unqualified rank the law has declared for him?

Applying these texts to the question of title, the law is equally explicit, Sec. 1212

declaring that "no officer shall be addressed * * * by any title other than that *of his actual rank.*" All military positions are dual in character, consisting of an *office* and a *rank*. The former is defined as "a position to which certain duties are attached" (Century Dictionary); the latter is "a titular distinction" that gives authority and dignity to the incumbent and carries with it the pay and emoluments necessary for his support. In the line the *office* represents the arm of the service; in the staff it represents a Department: to each there is inherent a title, and the law directs that of the two *the title of rank shall be used.* There is no authority either in law or regulations for any officer of the army to use the title of the Doctorate, or of any other civilian profession or occupation, nor does the technical "custom of the service" justify it; an interpretation of this phrase is a dangerous expedient in an argument, because it can only be used with success in the absence of written law or when it is "not in conflict with existing Statute or Constitutional provision," (Greenleaf Evidence, Par. 251) nor will any traditions, be they never so hoary with age, justify it; "An illegal or unauthorized practice, however frequent or long continued, cannot constitute a legal usage." (Winthrop, Military Law, Page 45.)

The scope of duty required of a medical officer is by no means limited to the "cure of bodies of men in the army," but by law and regulation includes the sanitary supervision of the army, and many other military duties that pertain to officers in general, to perform which the law has wisely invested him with the necessary authority. It was the possession of this authority that enabled him, during the War of the Rebellion, to organize and administer a military Sanitary Service that has been the admiration of the world and has given to foreign armies a model upon which their present splendid sanitary organizations are based, and for which they give us unstinted praise. In its continued possession and more complete recognition, the medical officer sees the way for a finished system which, by its carefully prepared methods and tactics, its well-drilled and thoroughly disciplined personnel, will free the fighting line from what has on many an occasion been a fatal encumbrance, and vastly increase the efficiency of the army with which it has the honor to serve.

The medical officer lays no claim to anything that is not clearly his legal prerogative; he finds that the law gives him equal rank with his fellow officers and requires him to wear the uniform and use the title belonging to that rank, and he obeys the law, not "offensively," but so far as my observation goes with quiet dignity and strict propriety. He fully appreciates the fact that his comprehensive work can never be properly done unless he follows closely the law under which it is carried on, and so far in the history of his Corps he has the proud consciousness of having won by his work the officially expressed commendation of all his superiors.

II.

"Whistler's Graphic Tables of Fire." Jump.

Capt. James M. Ingalls, 1st U. S. Artillery.

I HAVE read Captain Chester's entertaining article on "Jump" in the January number of the JOURNAL, in which I find the following broad principle enunciated "Whoever has a theory, or even a belief on the subject (Jump), ought to produce it without hesitation, however heretical it may seem to be." As I have a belief on the subject—it can hardly be dignified as a theory—I shall proceed to state it as a matter of duty. But first, now that this rather obscure subject is exciting some interest among the readers of the JOURNAL, I desire to place on record certain experiments for determining the magnitude of the Jump of an 8-inch converted rifle which were made

by me—assisted by Lieutenant Chamberlin, 1st Artillery—at Fort Monroe, June 27, 1889; especially as these experiments have been referred to by Captain Chester (JOURNAL M. S. I., No. 61, p. 420), by Lieutenant Whistler (Graphic Tables of Fire, p. 7), and by Lieutenant H. C. Davis (*Journal U. S. Artillery*, Vol. 1, p. 387).

A target-frame which had been used with a Bréger-Boulengé chronograph for determining muzzle velocities in connection with practice-firing with the field and siege guns, was placed perpendicular to the plane of fire and 100 feet in front of the axis of the trunnions of the 8-inch gun selected for the experiments. This target consisted simply of two upright posts mortised into a sill and suitably braced, between which a light wooden frame four feet square, covered with paper and sliding in grooves, could be placed at any desired height and securely fastened. A straight piece of board was firmly nailed across the target, the upper edge exactly at the level of the axis of the trunnions. As this straight-edge was taken as the origin from which the heights of the points where the various trajectories pierced the paper were measured, it was placed with great care by means of a Y level. Now let

x be the horizontal distance from the axis of the trunnions to the target.

φ' the angle of elevation, determined by applying the quadrant to the face of the piece.

φ the angle of departure $= \varphi' +$ Jump.

y' the height above the straight-edge of the point where the trajectory would pierce the paper if there were no Jump.

y the height of trajectory due to angle of departure φ; that is, the actual height of trajectory determined by the position of the centre of the hole made by the projectile in passing through the paper screen.

When the gun is laid with an angle of elevation of φ', the axis prolonged would pierce the paper screen at a height above the straight-edge equal to $x \tan \varphi'$; but since the projectile begins to fall toward the ground the moment it leaves the muzzle, we shall have, representing the very short time required by the projectile to pass from the muzzle to the screen by t',

$$y' = x \tan \varphi' - \tfrac{1}{2} g t'^2. \qquad (1)$$

Similarly we have

$$y = x \tan \varphi - \tfrac{1}{2} g t^2$$

It is evident that the second terms of the second members of these equations are practically of the same value, and therefore by subtraction we have

$$y - y' = x (\tan \varphi - \tan \varphi') \qquad (2)$$

whence

$$\tan \varphi = \frac{y - y}{x} + \tan \varphi'$$

by means of which φ is computed and then we have

$$\text{Jump} = \varphi - \varphi'. \qquad (3)$$

It is generally accurate enough (except when y and y' are large) to use the angles instead of the tangents in equation (2), which gives the following very simple formula for the Jump, *in minutes of arc:*

$$\text{Jump} = 3437.75 \left(\frac{y - y'}{x}\right) \qquad (4)$$

If x' is the distance from the muzzle of the gun to the target screen we have

$$S(v) = \frac{x'}{C} + S(V)$$

and

$$t' = C\left\{T(v) - T(V)\right\}$$

by means of which t' may be accurately computed, and then y' by equation (1). The value of y' for a given angle of elevation φ' is measured on each post of the target above the straight-edge, and a right line is then drawn across the paper screen through the two points thus determined, from which line the values of $y - y'$ can be easily measured with a pocket rule after each shot. For making the longer measurements the leveling rod belonging with the Y level may be used. The only difficulty experienced in making these experiments was in determining the exact centres of the rather jagged holes made in the paper screen by the projectiles, or in other words the true value of y; and it is believed that this is the only element of uncertainty in this method of determining the Jump. The gun was fired with solid shot and a charge of 35 lbs. of E V D sphero-hexagonal powder giving a muzzle velocity of 1252 f. s.

The following table gives the results of all the firings, eleven in number. The values of $y - y'$ are in feet.

Angle of elevation φ'	$y - y'$						Jump.
	1	2	3	4	5	Mean.	
2°	0.3175	0.3175	——	——	——	0.3175	10′.9
4°	0.7500	0.5830	0.437	0.708	——	0.6195	21′.3
5°	0.8500	0.9100	0.875	0.930	0.76	0.8650	29′.7

With breech-loading guns we can dispense with the Y level by converting the gun itself into a telescope tube and inserting thin discs pierced through their centres with minute holes, into the bore, one near the muzzle and the other at the bottom of the bore. Then by leveling the gun the proper position of the straight-edge on the target can easily be determined. The value of $x \tan \varphi$ can also be verified. In giving elevation to the piece by means of the quadrant, care should be taken that in the same series the reading of the quadrant should not be changed, and also that it should be applied to the face of the piece each time in the same position. One thing more with reference to these experiments. Lieutenant Whistler says (JOURNAL M. S. I., No. 60, p. 1188): "A very simple experiment, that of marking the trunnion, will demonstrate that the gun does not turn in the trunnion bed." Now this simple experiment was actually performed by us at least a half dozen times; and in every case it showed that the trunnion did move in its bed from a sixteenth to an eighth of an inch, and invariably in a direction which elevated the muzzle. This is an experiment that every artillery officer can make for himself during target practice. He has simply to prolong a diameter of the trunnion upon the trunnion bed, using a straight-edge and penknife or fine, hard pencil, and then after firing notice whether the line is broken where it leaves the trunnion. These experiments were not carried beyond 5° elevation because the target-frame was not high enough.

Lieutenant Whistler states in the place above cited as follows: "The idea sometimes advanced that Jump is due to the reaction or spring of the carriage, which has been compressed by the downward component of the recoil, is not satisfactory, as the shot is undoubtedly out of the muzzle before the reaction begins. We have therefore but one other solution of the problem." Now isn't it possible that we may have

still another plausible solution? Captain Chester thinks we have, and so do I. Why is it necessary to wait for the reaction or springing back of the carriage after compression in order to account for the phenomenon of Jump? Will not the combined backward and downward motion given to the axis of the trunnions by the compression of the rear part of the cheeks of the carriage, combined with the flexure of the chassis rails, caused by the sudden application of a force of several hundred tons upon the breech of the gun, be amply sufficient to account for the Jump? In the case of the 8-inch Naval gun for example, calculation shows that a maximum pressure of about 800 tons is brought to bear upon the bottom of the bore in the $\frac{1}{110}$ part of a second after the charge has been ignited, and when the shot has moved but $\frac{1}{13}$ of its entire travel in the bore. It seems to me that no carriage and chassis ever made could stand such a tremendous blow without yielding somewhat; and yielding is Jump.

I think the displacement of the axis of the bore and the elevation of the muzzle is greatest at (or about) the time of maximum pressure; and then, as the pressure relaxes while the projectile moves along the bore, and there is sensible recoil of the gun and carriage, the reaction, or springing back, of the compressed parts of the carriage and chassis (and possibly also of the platform—whatever is compressed when the gun receives its tremendous blow), tends to bring—and perhaps does bring—the axis parallel to, and beyond, its original position—setting up a sort of rocking motion of the whole system which could very easily cause a slight displacement of the trunnions in their bed, as was witnessed in the experiments detailed above. This reaction will perhaps explain the fact that our breech-loading 8-inch gun has a less jump than the much shorter 8-inch converted rifle; and may possibly account for the alleged negative jump of the very long Hotchkiss R. F. guns.

Capt. Frank Heath, Ordnance Dept. U. S. A.

To the Secretary Military Service Institution:

I regret to say that the facts which have been developed at the Sandy Hook Proving Ground in regard to the jump of the different guns and to the value of "c" for our B. L. Rifles are too limited in number and uncertain in character to be used as a basis for determining with certainty the truth or falsity of any proposed theory.

No firings have been made specially for determining the "jump" of a gun except with the 3"6 B. L. Field Rifle, Steel. The firings with this gun were conducted by Lieut. W. W. Gibson, Ord. Dept., in the following manner. Two wooden discs carefully prepared and centrally perforated were placed in the bore of the gun, and the axis of the gun so determined was directed on a wooden screen placed fifty feet from the gun. The point where the axis pierced the screen was marked, and by proper measurements the angle of fire was known. The gun was then fired and the distance from the point marked and the centre of the shot hole was measured, this distance being known the angle of jump was determined. The gun was mounted on the service field carriage placed on a platform of 4" yellow pine on sleepers. Check sights were taken to fix the position of the axis of the gun after loading, and every precaution was used to eliminate errors of observation and measurement. The mean results of two shots at each elevation are as follows:

Elevation.	Angle of Jump.
4°	18′ 45″
6°	15′ 35″
8°	11′ 50″
10°	12′ 20″
12°	12′ 15″
14°	13′
16°	12′ 35″

A single set of firings of this character would not of course be sufficient to determine with absolute accuracy the value of the angle of jump or the law of its variation. The results however, even if approximately correct, indicate that this angle is uniform rather than variable, as advocated in the interesting discussion of this subject by Capt. Chester in the January JOURNAL.

But granting that the variable angles contained in Lieut. Whistler's tables are correct for the gun (8" Converted Rifle) used by him, some of the causes given by Capt. Chester for this variableness appear to be entirely inadequate in their effects to be even considered as among the minor factors concerned in producing the observed results. For instance, the influence of the increasing vertical component of the weight of its projectile on the tension of the gases as the angles of elevation are increased, is infinitesimal as compared with the actual tension of these gases. If an 8" B. L. Rifle were fired vertically upward instead of horizontally, the tension of the gases would be increased about 6 lbs. per square inch, and diminished about the same amount if the gun were fired vertically downward. The actual tension of the gases is about 3700 lbs. per square inch and the increase or diminution of this pressure by 6 lbs. per square inch can have no measurable influence in controlling the circumstances of firing.

The argument of Capt. Chester in support of his opinion that the gun does not move while the projectile is in the bore, though plausible, is not sustained by experiment. The results of firings in this and other countries with a gun mounted on a "free recoil" carriage prove beyond question that the "gun do move." In this connection I would invite your attention to a work by H. Sebert, "Etude des effets de la poudre dans un canon de 10 centimetres." A translation of portions of this work would I am sure be of great interest to most of your readers. The firings on the "free recoil" carriage at this place have thus far been limited to the 8" B. L. Rifle, Steel, and the results show that it takes .013 of a second for the base of the projectile to get to the muzzle, and that at the end of this time the gun has acquired a velocity of recoil of about 18 feet per second.

The illustration of the soap bubble given by Capt. Chester does not appear to conform to the circumstances of the case. It would no doubt apply to a closed vessel, even though the material of the vessel were very elastic, but the gun and its projectile are essentially two separate bodies; the tie which holds the projectile to the gun is so frail as compared with the enormous forces involved, that for all purposes of calculation it could be entirely omitted by adding a few pounds to the weight of the gun. A better illustration would perhaps be to imagine two unequal blocks of stone or iron separated by a compressed spring, the moment the spring is released there would be a tendency of both blocks to move in opposite directions, and both would move, providing these were not too heavy, even though they happened to be held together by a yielding medium such as a piece of rubber or other similar material.

These subjects are exceedingly interesting and it is to be regretted that the data on which to base clear and well defined opinions are so limited.

Capt. E. T. C. Richmond, 2d U. S. Artillery.

After having carefully read the article on "Whistler's Graphic Tables of Fire,—Jump" in the January number, 1893, of the JOURNAL OF THE MILITARY SERVICE INSTITUTION, by Captain James Chester, 3d U. S. Artillery, I am happy to be in entire accord with the author as to the desirability of exhaustive discussion of, and free expression upon, all subjects pertaining to our profession; and therefore, feel constrained to remark upon some statements therein made, and to dissent from some conclusions therein drawn.

XUM

In the first place, is the "Literature on Jump" so limited as the above-mentioned article would lead the uninitiated to conclude? A complete analytical discussion of the subject may be found in a recent Ordnance note.

The rise of a spherical projectile by balloting is due to the fact that, in this case, the last point of contact is on the lowest element of the bore near the muzzle, and thus the projectile departs at a greater angle of elevation than that of the axis of the bore. If this point be on the highest element, there will result a less angle of departure. In both cases there will be rotation about a horizontal axis perpendicular to the plane of fire.

In the first case, the upper hemisphere will have a forward motion greater than that of the lower, with greater condensation of air on the upper than on the lower side; which will produce a depressing component and shorten the range. This counteracts, in a degree, the increased range due to the greater angle of departure caused by balloting; and thus the same cause (balloting) indirectly produces contrary effects, and the total effect upon the range will be their algebraic sum.

The second case may be reasoned upon in the same way; also lateral balloting. Here we have an explanation of the cause of the curve of the base-ball. It is believed that the gyroscope has never been called upon to explain the vagaries in flight of a homogeneous *spherical* projectile.

The idea that there can be no recoil until the projectile has left the bore, is so new, so startling and so entirely at variance with one of the fundamental principles of mechanics, as almost to take one's breath away. Suppose the gun and carriage were of equal weights with the projectile, what would then happen? A few moments thought on this should satisfy any one. The envelope is ruptured the instant the projectile begins to move, and recoil begins at this same instant.

Practically the maximum pressure on the chassis rails, due to the escape of gas through the vent would occur when the piece is parallel to these rails.

Let P = maximum tension of gases before the projectile leaves the bore, the piece and chassis rails being horizontal.

and p = additional tension of gases due to weight of projectile, piece vertical, muzzle up.

Then $p \sin \phi$ = additional tension of gases due to component of weight of projectile under angle ϕ.

and $P + p \sin \phi$ = total tension of gases under angle ϕ.

Suppose reaction proportional to tension of gases,

Then $(P + p \sin \phi) \cos \phi$ = downward vertical component of reaction.

$$\text{Let } \frac{p}{P} = a.$$

Then $p = a P$,

and $(P + a P \sin \phi) \cos \phi$ = downward vertical component of reaction.

In this P and a are constant.

Now at what angle is this component of reaction a maximum?

Place $U = (P + a P \sin \phi) \cos \phi$.

$$\text{Then } \frac{d U}{d \phi} = - P \sin \phi + a P - 2 a P \sin^2 \phi = 0.$$

$$\text{and } \sin \phi = -\frac{1}{4a} \pm \frac{1}{4a}\sqrt{1 + 8 a^2}.$$

Neglecting a^2 as very small, we have

$$\text{Sin } \phi = -\frac{1}{4a} \pm \frac{1}{4a} = 0, \text{ and } -\frac{1}{2a}.$$

The first value gives $\phi = 0$ for a maximum, as it should.

The restoration of a^2 would give to sin ϕ an appreciable value, which shows that the maximum really corresponds to a small angle of elevation; but since p must be *very* small as compared with P, this angle may, practically, be considered 0. The second value corresponds to a minimum, and the negative sign indicates that the piece is depressed. This maximum reaction is equal to $\pi v^2 P'$, in which v is the radius of the vent and P' the pressure in pounds, per sq. in. With $v = 0.1$ in. and $P' = 33{,}000$ lbs., we have $3{,}1416 \times .1^2 \times 33{,}000 = 1037$ pounds, a pressure believed to be entirely inadequate to produce the flexure of the chassis rails necessary to give the observed jump of twenty or thirty minutes of arc. In our 8-in. muzzle-loading rifle, the distance from axis of trunnions to heel of sole is about six feet, and to produce an elevation of thirty minutes, the chassis rails would have to be sprung more than six-tenths of an inch. But our 8-in. M. L. Rifle has no breech support, and any pressure downward, applied to the piece back of the trunnions, would be transmitted, partly to the trunnions and partly to the axis of the hand elevating wheel. Now these are both well *forward* of the heels of the soles of the top carriage, in fact, the resultant pressure would pass *forward* of the central cross-line of the soles, and there would be no rear-tilting of this carriage due to the spring of the chassis rails, but the whole system would be depressed, the axis of the bore remaining parallel, approximately, to its initial position.

Assuming, for a moment, the spring of the chassis rails and jump to be due to vent-action; this vent-action as shown above, will be greatest when the piece is, approximately, horizontal, and will decrease with the elevation. Thus the jump should be greatest here and decrease with the elevation, which does not agree with observation. It would seem that any one of three very simple experiments would test the vent-jump theory. Two hydraulic jacks, one supporting each of the chassis rails directly opposite the vent, would certainly greatly diminish, if not entirely prevent the spring of these rails. Or second, a vent-closing friction primer, or third, and most conclusive, mount the gun vent down. Assuming with Major McKinley and Lieut. Whistler, that jump is due to the back-action of the gases, and consequent recoil and tilting of the gun and carriage, it would seem easy to account for its varying with the angle of elevation of the piece. In fact, it would be very surprising if it did not so vary. With every change of elevation there will be a corresponding change in the lever arms of the several forces acting upon the several parts of the system; and the surprise should be the greater if any two elevations gave equal resultant effects; except after having passed a maximum or minimum limit.

Lieutenant H. H. Ludlow, 3d U. S. Artillery.

In his article entitled "Whistler's Graphic Tables of Fire.—Jump," Capt. Chester makes the very remarkable claim "that recoil has nothing to do with jump in breech-loading rifled guns. [See p. 123 JOUR. MIL. SER. INST. for Jany., 1893.] This claim is a conclusion from the premise that there can be no recoil until the "envelope" formed by the gun and projectile is ruptured by the departure of the projectile from the gun. Let us examine this premise.

"A man cannot pull himself over a fence by pulling on his boot straps." Neither can the force within the gun move the envelope (including gunpowder and projectile) as a whole, while changing the position of its parts before rupture. The centre of

gravity of the entire envelope and its contents will remain at rest or with uniform motion unless an extraneous force be applied to it. But Capt. Chester seems to have erred in assuming that the envelope yields on one side only. Such yielding would move the centre of gravity which can only result from the application of an extraneous force.

To estimate the movement of the gun in such a case, let the weight of gun and contents be so supported as to leave it free to move in the direction of its axis taken horizontal; the seat of the charge be of the same diameter as the bore of the gun; and let the powder be completely converted into gas before the projectile moves.

Assume W = wt. of gun. w = wt. of projectile. w' = wt. of powder charge.

G = distance from base of bore to centre of gravity of gun.

g = distance from base of projectile to its centre of gravity.

X = variable distance from base of bore to centre of gravity of envelope and contents.

x = variable distance from base of bore to base of projectile.

A = initial value of X. a = initial value of x.

Then will

$x+g$ = variable distance from base of bore to centre of gravity of projectile.

$\frac{1}{2}x$ = variable distance from base of bore to centre of gravity of powder gases.

The principle of centre of gravity (parallel forces Mechanics) gives

$$X = \frac{WG + w(x+g) + w'\frac{1}{2}x}{W + w + w'} \qquad \therefore \quad A = \frac{WG + w(a+g) + \frac{1}{2}a\,w'}{W + w + w'}$$

$$\therefore \qquad X - A = \frac{w + \frac{1}{2}w'}{W + w + w'}(x-a).$$

in which $(x-a)$ measures the travel of the projectile in the bore and $X-A$ the corresponding recoil of the gun.

For the 8" M. L. R. (converted), W = 16 160 lbs. w = 180 lbs. w' = 35 lbs. Length of bore = 117.25 inches. [See Tidball's Manual of Heavy Artillery.]

If $x-a$ = 100 inches $\qquad X - A = \frac{19750}{16375} = 1.2$ inches.

In practice the gun is constrained by the inertia of the top carriage, by the inclination of and friction on the chassis-rails, as well as by the hydraulic recoil-cylinder. The actual recoil will therefore be much less than that computed above. In fact it may be questioned whether the top carriage begins to slide up the chassis-rails before the projectile leaves the gun. But it cannot be doubted that the tendency of the gun to move to the rear will bring into play rotating couples ample to account for a very noticeable jump.

The escape of gas through a vent would undoubtedly alter the jump due to recoil alone. How much of the jump is due to this cause can only be determined by experiment. But whatever value it may have will all be removed by using an obturating primer in a vent of any direction. Our progressive Navy have adopted the axial vent with obturating primer.

Diligent inquiry at the Ordnance Dept. U. S. Army has not discovered any record of jump for U. S. Army guns except for the 3".2 field gun given in the Report of the Chief of Ordnance for 1885, as follows:

Elevation	0°	4°	8°	12°	16°	20°
Jump	20'00"	22'15"	23'15"	20'45"	17'07"	24'20"

with 13 lb. projectile, and 3½ lbs. X L A powder, giving V = 1590 f. s.

The projectile, powder charge, and pattern of carriage for this gun have been altered since this determination was made.

Through the courtesy of Prof. Alger and Lieut. Reynolds, U. S. Navy, the following determinations of jump for U. S. Naval guns are furnished:

60 pdr. M. L. R. compressor bar carriage		Jump	17′00″
8″ M. L. R.	V = 1409 f s.	Jump	5′00″
5″ R. F. G.	V = 2300 f.s.		5′30″
10″ B. L. R.	V = 1700 f.s.		6′42″
	V = 2000 f.s.		6′42″
12″ B. L. R.	V = 1700 f.s.		7′18″
	V = 2000 f.s.		7′18″
5″ B. L. R. Gravity return carriage	V = 1700 f.s.		3′35″
	V = 2000 f.s.		3′06″
6″ B. L. R. Grav. ret. Mark II.	V = 1700 f.s.		3′30″
	2000		4′00″
6″ B. L. R. (30 cal.) Grav. ret. Mark III.	V = 1700 f.s.		— 3′00″
	2000		— 7′00″
6″ B. L. R. (35 cal.) Grav. ret. Mark III.	V = 1700 f.s.		0 00
	2075		— 4′12″
8″ B. L. R. (35 cal.) Grav. ret.	V = 1700 f.s.		— 3 54
	2100		— 6′00″

The muzzle-loading rifles have open oblique vents. All others have axial vent and obturating primer or centre fire metallic cartridge cases.

The recoil is taken parallel to axis of piece in 5″ R. F. gun and in 10″ and 12″ B. L. R. In all others the recoil is inclined to the axis.

It appears that the style of carriage and manner of control of recoil materially affect the jump. It is remarkable that several values of jump are negative.

Lieut. Henry C. Davis, 3d U. S. Artillery.

Captain Chester's notice of "two statements" contained in an article of mine published in the *Artillery Journal* for October, 1892, has been called to my attention. (See JOURNAL OF THE MILITARY SERVICE INSTITUTION, January, 1893.)

The subject is jump and he quotes, (1) "That it is small," (2) "It will probably be constant." The adjective "small" is a matter of taste, as no values are given. To the second quotation, in order correctly to convey my ideas, I should have added the words "under given conditions." I must confess, however, that, *at that time*, I did not consider a change in elevation as among the more important changes in conditions. Since then experiments made, similar to Lt. Whistler's and indeed suggested by his, have led me to suspect that I underestimated the importance of this change.

Commenting further on the article above cited, Capt. Chester takes up the experiment on free recoil made with the barrel of the Springfield rifle. The explanation offered to account for observed results is interesting and ingenious. He says (page 123) that the experiment is not representative because "the Springfield musket and its cartridge are in reality two guns, one within the other, and the inner one shoots first, also shoots backward, that is *the gun is shot off the projectile** *instead of the projectile being shot out of the gun*." "Army officers have had so much trouble with this feature of the Springfield musket on the rifle range that there is hardly any excuse for forgetting it when trying a delicate experiment." "The peculiarity to which we refer manifested itself originally in the breaking of the cartridge shell." Further on (p. 124) he says. "Indeed, if we remember rightly, the breaking of the cartridge shell was always accompanied by bad shooting, which would be the natural and necessary consequence

*The Italics are mine. H. C. D.

of recoil before the bullet left the muzzle." Bad shooting accompanying frequent breaking of the shell, has been by some attributed to the annoyance caused to men.

Assuming that the cause cited by Capt. Chester would produce the results noted, let us see what the facts in the case are. (1) None of the shell broke, although weakened by being used two or three times: hence the absence of one of the manifestations of the supposed cause.

(2) The shells were not resized. Experience teaches that this means the forcing home of the shell with the breech block and the very probable absence of "jog room." "between the bottom of the chamber (breech block) and the base of the cartridge."

(3) No firing pin was used whose blow might have driven forward the cartridge and formed a "jog room."

(4) On the existence of this "jog room," Mr. Morse bases his explanations of certain phenomena which Captain Chester has used to account for the premature (?) recoil of the experiments.

In this light, it does not seem probable, to say the least, that this perturbating cause existed in *all* the experiments. After the apparatus was in running order none of the experiments failed to show the results claimed.

There is another fact mentioned incidentally, which is novel and which taken with Capt. Chester's theory as to when recoil begins, is of interest scientifically as the legitimate conclusion, arguing from his premises.

The two guns (see quotations above) differ from one another in but one essential, that is, in their weights as compared with each other and with their common projectile.

We see from this same quotation that the bullet behaves in a diametrically opposite manner in the two cases.

First case: The bullet *stands still* till the gun (cartridge case) is shot off of it. Second case: The gun (rifle barrel) *stands still* till the bullet is shot out of it. This is a fair statement of the case under Capt. Chester's theory, for no movement can take place in the enclosing envelope, except on its weaker (lighter) side, till rupture (escape of the bullet) takes place. This being the case there must be some gun, intermediate as to weight, which will neither be shot off the bullet, nor out of which the bullet will be shot. When the gun equals the bullet in weight there will be no weaker side to the envelope, and so neither gun nor bullet will move. What will happen? Under the theory nothing can happen. Lighten the gun ever so little and it is shot off of the bullet, or lighten the bullet ever so little and it is shot out of the gun, but with equal weights there seems to be a hiatus; certainly a novel and interesting state of affairs.

The acceptance of the applicability of the law of reaction to the gun and shot leaves no such anomalous condition of things in passing from one to the other of the extreme cases as cited above.

But all this is byplay, for discussion ceases to have place when the point at issue,—*recoil while the bullet is in the bore*,—has been settled by a series of experiments, which experiments were not vitiated (?) by the gun-within-gun condition. The experiments are (1) those by Col. Sebert and Capt. Hugoniot of the Artillerie de la Marine of France, made in 1880 and published in the *Memorial de l'Artillerie de la Marine*. These experiments are also published in a separate pamphlet, by L. Baudoin & Cie, Successeurs, Paris, France, 1882, and entitled "Étude des effets de la Poudre dans un canon de 10 centimètres, par H. Sebert, Lt. Col. d'Artillerie de la Marine, et Hugoniot, Capitaine d'Artillerie de la Marine." "Avec planchés." This information is given in full for the benefit of those who have not been so fortunate as to read this pamphlet which is recommended as well worth any time put on it.

(2) Those by our own Ordnance Department at Sandy Hook, where one of Col. Sebert's recoil velocimeters is used. An eye-witness of some of the experiments (an

ordnance officer) tells me there is no question that the apparatus proves recoil to be as claimed.

Not only has the establishment of the existence of this premature (?) recoil been accepted by scientific artillerists, but results deduced from its measurement are used in the calculations for obturating bars for recoil checks, and Col. Sebert from the same results calculates gas pressures and velocities for the shot while in the bore.

As already stated our Ordnance Department seems to have been sufficiently convinced of the existence of this recoil and of our ability to measure it as a function of time, to invest several thousand dollars in an apparatus for experimental work in this country.

The literature of recoil and recoil checks has of late years been thoroughly pervaded by Hugoniot's "free coil" deductions. Not only have foreigners bowed the knee to this strange god, but our own works are either full of the new cult or else simply refer to it as an accepted fact. Can it be possible that Col. Sebert, Capt. Hugoniot and our Ordnance Department have been deceived as to a *question of fact* (*not theory*)?

To dispute at this day, the truth of a statement proven, not theoretically alone but practically, not one time only but many times, without bringing forward excellent reasons for rejecting the experiments, shows a "temerity" "for which there is hardly any excuse."

Lieutenant L. G. Berry, 4th U. S. Artillery.

Lara. Are you the master here?
Victorian. Ay, here and everywhere, when the wrong of others
Gives me the right!

In Capt. Chester's comment appear certain ideas which, starting from an English source, have possessed a greater or less currency for some time. First of these is the idea that recoil does not begin until the shot leaves the gun. Judging from the ordinary evidence of the senses it would seem that this might be the case. But on close investigation we find that in this as in most other cases of like nature, the senses are deceived and that the gun and projectile move simultaneously. If such be not the case the question may be asked why does the projectile move at all? and may we not find one which will refuse to move? So that the gun will shoot backwards instead of the projectile forwards. The true mechanical principle is thus stated: "If a system of masses be subjected only to its mutual attractions, its centre of mass will either be at rest or move uniformly in a right line" (Michie's Elements of Analytical Mechanics, p. 198). So that if the projectile move to the front the gun must move to the rear, the centre of mass of the entire system remaining fixed. Lieutenant Davis made a number of very conclusive experiments, some of which I witnessed, and there was no "gun within a gun" action. Captain Chester might have witnessed some of these experiments if he had desired, in fact he was invited to witness them, but he did not do so. He reminds me of the Irishman who was open to conviction but would like to see the man that could do it.

Captain Chester's theory of jump is interesting. He supposes that the pressure on the bottom of the gun is greater than that on the top of the gun owing to the location of the vent on top, and that jump is caused by this fact. If the area of the vent is a little less than $\frac{1}{100}$ of an inch and the pressure about 30,000 lbs. per sq. in. which are common values, the effect is about the same as would be produced by a man of Captain Chester's proportions sitting on the gun for one hundredth of a second. The moment of this force is not nearly so great as the moment of the pressure on the base of the gun about the centre of mass of the system in the ordinary gun. If the line of direction of a force do not pass through the centre of mass of a body on which it is acting, the body will tend to rotate about its centre of mass.

This is the principle of the ordinary scales, and of a great many other things in common application in every-day life. It applies equally to a gun.

That a gun fired from a chassis rail should change its jump with different elevations is to be expected. For the moment of the force producing recoil would change, and the component of this force preventing jump would change also. The construction and elasticity of the carriage also enter the problem. At the present time therefore the problem can only be investigated experimentally.

III.

"The Knapsack."

Lieut.-Col. J. H. Page, 23d U. S. Infantry.

I HAVE read with a great deal of pleasure Capt. Quinton's article upon the knapsack in the January number of the JOURNAL OF THE MILITARY SERVICE INSTITUTION.

It is a subject that affects the foot soldier more than long range rifle or smokeless powder. It seems strange, that after our war thirty years ago, when thousands of knapsacks were abandoned by the soldier to enable him to reach the battle-field and do his share in the fight, inventors to-day still persist in trying to weigh down the infantryman, and our Departments encourage them by appointing boards to test their contrivances.

Capt. Quinton has struck the key-note. Knapsacks are useless and a fraud; more to-day than when he probably abandoned his to enable him to reach the front "in days gone by."

His remarks about our uniform are universally accepted by his comrades. Give us canvas of a dead-grass color for field service, blanket lined for winter; let shoes and stockings be in the train side by side with the ammunition. A hole in the pants of a soldier does not affect his fighting capacity or his manœuvring qualities, but a hole in the shoe relegates him "nolens volens" to the brigade of coffee coolers. A shoeless soldier does not need ammunition.

Captain Quinton touches the shelter-tent rather cautiously and expects criticism. A dog likes a kennel, the American soldier a home. The shelter-tent is his all, his home. "Me and my bunkey" have spent many a pleasant day and night in our little shelter. If it does not shed rain it breaks the big drop into mist, hides the full moon, shuts out the stars and is something between Heaven and earth; we are not tramps or Arabs, and would rather have the dew fall on something else besides ourselves.

Legs will settle future campaigns as much as flat trajectories, so save them as much as possible.

Lieut-Col. J. G. C. Lee, Deputy Q. M. Gen. U. S. A.

Capt. Quinton's article is a step in the right direction. Whatever can be done to lighten the load of the soldier on the march is clearly in the interest of effectiveness. Whether all his suggestions are entirely practicable remains to be seen. Doubtless his presentation of the matter will draw out all the advantages and objections of the present knapsack and lead to the adoption of the best device that can be secured, after all the light on the subject has been brought to bear. To my mind the evidence of company officers, supplemented by that of intelligent and practical enlisted men having long service, will lead to the best result.

It seems to me clear that men on the march should carry the least that will make them reasonably comfortable, and protect them from the weather, and this will depend

somewhat on season and climate. Some men too will be content with less than others, by reason of temperament. My observation in the field was, that in the winter each man would carry two woollen blankets and one water-proof, the latter rolled around the former, and shed one or more as the spring and summer were reached. Two men would thus join forces, lay one water-proof on the ground, one pair of woollen blankets thereon, and cover themselves with the other pair of wool blankets with the other water-proof on top.

I think the shelter-tent affords little additional protection, and share Captain Quinton's views as to its inadequacy. When heavier and larger tents cannot be carried in wagons, the water-proof blanket gives the best protection from dampness beneath and weather above.

For a march of any consequence, I do not see how the extra shoes and stockings can well be spared. It is true all will not be needed, but many may be, and I find no way to adjust the supply to the need better than through the judgment of the company commander. The same reasoning will apply to the underclothing. A change appears absolutely essential. The picture of a soldier divested of his underclothing while he washes it in the passing stream and dries it in the sun or by the camp fire, suggests much discomfort and possible impairment of health. A towel, soap and pocket comb will be needed. With the foregoing the soldier can do very well for any march or campaign not absolutely demanding tents; and when tents are demanded there should be wagon transportation for them.

If brought into action, the troops will soon pile and leave as much of their equipment as possible, under all circumstances.

But the blanket bag, hair brush, whisk broom, hold-all, and such unnecessary equipments can well be done away with.

Transportation by rail, water and wagon can now be so readily availed of to all parts of the country, that the load of the soldier can safely be reduced to the very lowest limit.

I cannot but think that Captain Quinton's article will be productive of good.

Capt. Fred. H. E. Ebstein, 21st U. S. Infantry.

"The easiest and best way to carry a knapsack," said an old soldier, "is in the baggage wagon." This is a truism not to be gainsaid, provided the baggage wagon is available for that specific purpose. But as in campaign it is practically impossible to furnish unlimited transportation, the infantryman must carry upon his person those articles that are necessary for his efficiency and comfort. It is immaterial whether these be contained in a blanket-bag, knapsack, pack or roll—one or the other of them he *must* carry. At the same time it is essential that the weight carried be so regulated as not to sacrifice efficiency at the expense of comfort.

I agree with Captain Quinton that we require our soldier to pack in his knapsack many things for which he has no real use. All unnecessary articles should be eliminated and a style of knapsack adopted that can be carried with the least fatigue to the wearer. On the other hand, however, it must be admitted that we are prone to underrate the true value of the knapsack and regard it largely as an ornament to be neatly packed and paraded on the bunk at inspection of quarters. The soldier rarely wears it and considers it a great and unnecessary hardship when he has to.

It is no less important to accustom the soldier to the carrying of his knapsack than to teach him the use of his weapon. Let us rid ourselves of the idea that the knapsack is a useless encumbrance. No canvas shooting coat such as suggested by Capt. Quinton can, or ever will, be devised to take its place.

Whatever kind of pack may be in use, it is of the greatest importance that it be

fitted or adjusted to the man to whom issued, under the eye of an officer. An ill-adjusted knapsack will more quickly disable a man than an overweighted one. The weight of the packed knapsack and the articles to be carried should be fixed by regulations and not left to the varied opinions of individual commanders. The recruit should be regularly instructed in the packing of his knapsack and should be frequently practiced in marching—first with light, and gradually with the full pack. In like manner troops should have practice marches from their garrisons and back once or twice a week during the drill season. The regular inspections should frequently be held in heavy marching order. Guard mounting should not be a full-dress ceremony; the guard details should march on with knapsacks containing blanket and overcoat. It is just as easy, and certainly more military, to so carry these articles than to permit the individual members of the guard to straggle back to barracks after guard mounting and carry them to the guard-house slung over the arm as is now the universal custom.

Let us accustom our men to the wearing of the knapsack so that they will not break down under its weight in active service, rather than occupy our minds with impracticable schemes of ridding ourselves of what is, no doubt, a disagreeable, but nevertheless absolute, necessity to the foot soldier.

Capt. Thos. H. Barry, 1st U. S. Infantry.

Captain Quinton in his article on the knapsack in the January number of the JOURNAL OF THE MILITARY SERVICE INSTITUTION has, it seems to me, struck the keynote of the infantry soldier's equipment for active campaigning.

As he very tersely implies it should not be a question of whether the weight should rest on the shoulders, hips or back, but rather one of relieving the soldier of every unnecessary weight on any part of his anatomy. Those of us who were not old enough to have taken part in the Rebellion are constantly reminded by the participants therein, that a few days after the beginning of the spring campaigns would find the men stripped of everything except the clothing on their persons, their rations, ammunition and one blanket.

The "packs" were thrown away or left by the roadside to become the property of the sutler, who gathered them up and sent them to the rear to be disposed of at the highest figure.

Now that all nations are vieing with each other in securing a weapon from which can be fired the greatest number of cartridges in the shortest time, which implies that the soldier of the present day must carry upon his person more ammunition than ever before; and that all modern authorities on the art of war teach us that modern formations will be accompanied by an increased depth of column, which means that the wagons, if there be any, will be several miles further to the rear and will not reach the soldier, if at all, till morning, when he is about to start on the next day's march, making it necessary that he carry with him at least three days' rations; there seems to be all the more reason for his discarding everything that *he realizes* is not absolutely necessary.

Start him out on the campaign with a serviceable rifle, a good suit of underclothing, a pair of *suitable marching* shoes, a pair of socks, a good hat, three days' rations of coffee, sugar, bread and meat, the necessary ammunition and one blanket,—or what is better still a canvas lined overcoat which can be rolled like the blanket and carried over his shoulder, and inside of which might be carried a change of underclothing and two pairs of socks, and the soldier finds himself burdened with everything that he should be expected to carry, and, barring accidents, his clothing equipment is suitable for a month's wear at least, at the end of which time, or when opportunity presents itself, he should replace any articles worn out or unserviceable.

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Furthermore, it is not just to the soldier to issue and charge to him the additional articles of clothing necessary to fill a blanket bag or patent knapsack, for in the event of their being lost or stolen he is the loser. All extra clothing should be held by the Government till needed by the soldier.

I have made numerous marches in the last thirteen years, some long and some short, and the blanket bag with its contents has generally been relegated to the wagons, fortunately for the command, and the men have carried a rolled blanket over the shoulder.

The commander who sees to it that his men have the articles of equipment and clothing enumerated above, will be more successful than he who worries himself about the proper contents of the blanket bag, or whether Private Brown has his soap where his toothbrush should be.

If we go into the field for comfort why not take the wire woven bunk bottom and mattress?

Fortunate is the soldier, who in an active campaign finds himself with suitable clothing on his back, a good pair of shoes on his feet, the staple articles of the ration in his haversack, his canteen, tin cup, the necessary ammunition and a good rifle. Should he have in addition a blanket or blanket lined overcoat which answers the double purpose, he is a fit subject for congratulation. Why then burden him with a blanket bag or knapsack filled with unnecessary clothing?

IV.

"Musketry Training, and its Value in War."

Capt. W. P. Clarke, 2d Infantry, N. G. Colorado.

THERE has been nothing published in the JOURNAL during the past year that has struck the key-note so closely as Captain Parker's "Musketry Training, and its Value in War." To the man who has given any attention to the matter his points and arguments are conclusive, and it is a matter of regret that his able article cannot be placed in the hands of every officer of both Regular and State service.

While the army is doing much to bring about efficiency with the rifle, the troops of most of the States are practically without training of any sort. In many where a system of rifle practice is carried on, it is deficient in the very elements which should make it valuable. It is hardly to be hoped that this country will never again become involved in war. Captain Parker may not see it, you may not see it, I may not see it, but some day it must come and when it does come the National Guard must supply the needed assistance and reinforcements for our little army.

In most organizations and States the crack company or regiment is the one which presents the finest appearance or drills the best, while the same number of men in another organization, not so well drilled, not so handsomely uniformed, are not mentioned in the same breath, even though seventy-five per cent. of its membership are trained to the use of the rifle while in the first named regiment there is not one.

What is most needed by the National Guard of the country is a national method of qualification as marksmen and sharpshooters with a uniform series of decorations which will mean the same in every State in which it is seen. Blunt as a basis, but so modified as to be available to the National Guardman, should be the guide. All States having a National Guard should unite to accomplish the bringing about of this uniform system, for as now practised not a half dozen of the States have a system that would avail them much in actual warfare and in some, as in this State, the system acts as a

discouragement to the poor shots instead of encouraging them to build themselves up and become good shots. In other States a few crack shots are fostered at the expense of the general service.

Skirmish firing is almost unknown in the National Guard systems of qualification and yet on the skirmish line has been done some most effective work and now, more than ever, under the extended order, will the skirmish line play a most important part, Gen. Joseph E. Johnston tells in his "Narrative" how his skirmish lines many times held their rifle pits against a largely superior force of our troops because they knew how to make their bullets tell and shot to kill.

State troops should be instructed in the use of the rifle at 100, 200, 300, 500, 600, 800 and 1000 yards, and in skirmishing. The principal work will be done at the first three ranges. A soldier thoroughly instructed will be of unquestionable service on the field.

I am what might be termed a crank on the subject of rifle practice and have made a study of the methods of many States, and most unhesitatingly say that the system compiled by Colonel James M. Rice for the Illinois National Guard is head and shoulders above that in use in any other State in the Union. For the other extreme it is not necessary to go out of this State.

In some States rifle practice is not encouraged and its importance not recognized, and until a convention of the proper officers of the various States shall fix upon an uniform and effective method we can hope for nothing better than we now have.

V.

"Military Specialists."

Lieut. G. W. Read, 5th U. S. Cavalry.

IN addition to the new ideas acquired from the interesting paper of Captain Hess, form has been given to a few old ones, heretofore floating aimlessly and shapelessly about my brain. In these "piping times of peace," it is difficult to draw the line between the theorists and "those of a different mould, who, with coats off and sleeves rolled up, are making guns and ammunition, and training the minds of men to methods to meet the changed condition of things." There is an important distinction between a theoretical theorist and a practical theorist. In the absence of modern war experience, certain vitally important problems are incapable of other than a theoretical solution.

Many young officers are no doubt deterred from a public expression of their opinions in regard to modern battle tactics and kindred subjects by the idea that a solution based upon pure theory, as theirs of necessity must be, would be open to the unfavorable criticism of older officers whose war experience would naturally better qualify them to deal with the problems in question, and whose superior knowledge would lead them to class the "young doctors" as "piping theorists." It would seem, however, as if a young officer who has conscientiously studied, might be quite as well prepared for a valuable discussion of these important questions, as one with a large experience in war under conditions which no longer exist. Such problems can be approached to good advantage by a mind unhampered by the opinions acquired in the practice of an obsolete system. It is true that those who have been in battles are better able to appreciate the conditions which must exist in the future and thus have more data at their disposal for a determination of what must be done; but it can hardly be said that their ideas on modern attack and defense, for example, are much less theoretical than those of the younger generation.

Captain Hess thinks "the enhanced individuality of the animal, man, due to his intellectual development, renders him less liable to that perfect surrender of himself to the control of another, which we call discipline. There may have been a time in his history when he went because he was told to go. He does *now* sometimes, but it is not safe to rely wholly on that for obedience. If, when the command comes, there comes with it conviction that the order is the proper one to accomplish the object in view, feet and hands act in unison with his heart, and his task is half accomplished in the beginning." In an army such as would have to be raised in this country in the event of great national danger, there would be many officers and non-commissioned officers with an exceedingly limited military knowledge. Very often they would know little if any more than the intelligent privates under them. Are the latter to hesitate about obeying an order whenever they think a better result might be accomplished in some other way? If so, what an iron discipline will be required in handling such a mob! There is little doubt, however, that his greater intelligence will make the soldier recognize the necessity of absolute and unquestioning obedience. It has been the experience of officers in command of State troops that young men of good family and high intelligence are more amenable to discipline than any others. If it is not safe to wholly rely on a soldier's going *simply because he is told to go*, there is little hope for the success of an army composed of such men.

But no matter what may be the composition of our national army, a great deal of time will be required to train it for field service. We are told that in order to make a capable soldier out of a raw infantry recruit when time presses, it is absolutely necessary to train him in discipline, in the use of his rifle at all ranges up to 400 yards, in skirmishing, and in taking advantage of ground and cover. There must also be collective instruction, first, in moving slowly and with cohesion in close order; second, in performing evolutions and deploying; third, in fire discipline; fourth, in the general requirements of outpost duty.* Much more time would be required to train cavalry and artillery. There is a growing tendency in this country to place undue reliance upon the National Guard. No one who is at all familiar with this well-organized force has failed to observe that it is composed of superb material and that it is developing in efficiency. But it falls far short of the minimum requirements just outlined, and is altogether too weak in numbers and efficiency to form an adequate national reserve. Nor is there any prospect that it will develop under the present system with sufficient rapidity to meet the ever growing necessities of the country. The entire failure of our government to profit by the lessons of the past and create a suitable military force, leads to the conclusion that the best work for our practical theorists nowadays is to bend every effort to the evolution of a scheme for the organization of such a force. Until we have the material to work with, discussions as to the best way of training it in time of peace or of leading it in battle are of little avail. Should there be occasion to use such an army now, the training it could be given would be only the minimum which is possible when time presses, and the battle tactics for the use of a thoroughly trained force would have to be extensively modified. It cannot be supposed that an army of the kind that could be raised in the United States to-day, could be successfully handled in the first offensive battles according to the principles of the Drill Regulations, which require "the breaking up of a command into small fractional parts at one or two miles from the enemy's position and the maintenance throughout the advance and fight, of that cohesion of the parts which enables the main purpose and direction of the action to be under the control of the senior commander present."

The time must come when the army will be suitably increased and when the proper

* Captain Parker, quoting Von Scherff, JOURNAL M. S. I., No. 61, p. 61.

reserves will be organized. This is inevitable from that very increase of intelligence of which Captain Hess speaks, and which it is to be hoped is not entirely confined to soldiers. With an organized force of 160,000 men in Mexico, of whom 40,000 are regular troops, and with more than 25,000,000 of trained soldiers under arms in Europe, the policy of the government to ignore the question of national defense cannot be indefinitely postponed. But under present conditions, all discussions of the proper way to handle a modern American army in battle must be characterized as "piping theory" when they fail to take into careful account the superficial instruction of the rank and file, and the ignorance and lack of training of the officers and non-commissioned officers. Few military students fail to give due weight to the element of morale.

An urgent necessity exists for the careful study and discussion of the questions :—

(1) In case of immediate necessity, how should a national army be raised and organized?

(2) In view of the rapidity of modern military operations, what is the minimum time that would be available for the training of such a force?

(3) In the absence of sufficient time to train it thoroughly, what instruction is most important to be given in the time available?

(4) Would it be possible, in the minimum time available, for such a force to be made proficient in the application of the system of battle tactics outlined in the Drill Regulations, especially if opposed to a thoroughly trained army?

These and similar questions are not only worthy the consideration of the practical theorist but demand his attention.

VI.

"Queries on the Cavalry Equipment."

Capt. W. H. Carter, 6th U. S. Cavalry.

THE opening paragraph of Lieutenant Cole's article is decidedly unfair to the Ordnance and Quartmaster's departments inasmuch as it states that "much of our equipment is the result of deep thought on the part of officers of the Ordnance and Quartermaster's departments and has been continued in use as steadfastly as if no recommendations on the part of officers of the mounted service had ever been made in regard to it." Subsequent to the Rebellion the cavalry equipment was continued practically as it was during the last year of that contest until 1873, when a board of officers was ordered in compliance with the following request :

ORDNANCE OFFICE, WAR DEP'T.
OCT. 7, 1873.

SIR :

I have the honor to recommend that a Board of Ordnance and Cavalry officers be assembled, at some point west of the Mississippi River, to consider what changes if any should be made in the modification of the present horse equipments, cavalry equipments and accoutrements, and saddler's and blacksmith's tools and materials for cavalry troops in the field, as now prescribed by General Order No. 60, War Department, Adjutant-General's Office, June 29, 1872, and to recommend a standard table of supply of everything necessary to efficiently provide for the wants of the cavalry service.

If this recommendation is concurred in, it is further recommended that all company commanders of the cavalry be invited to submit their views on the subjects proposed to the board, and that this office be authorized to submit such information as it may have.

Very respectfully, your obedient servant,

(Signed) A. B. DYER.
Chief of Ordnance, United States Army.

The board was detailed by S. O. No. 238, A. G. O., Nov. 29, 1873, and consisted of one ordnance and four cavalry officers.

The detail as first made comprised Col. R. S. Mackenzie, Captains J. J. Upham, A. Mordecai, Guy V. Henry and L. H. Carpenter. Before the board met Col. Mackenzie was relieved and Col. I. N. Palmer detailed in his place.

Every troop commander had an opportunity to make suggestions. The proceedings of this board may be seen in Ordnance Memoranda No. 18.

The next board on cavalry equipments was in 1884, and was composed of Col. W. B. Royall, Major Guy V. Henry, Captain Chas. Bendire and Lieut. J. H. Dorst. This board fixed the veterinary supply table also, and there were no officers of the Ordnance or Quartermaster departments detailed as members.

I believe a perusal of the proceedings of these boards will convince Lieut. Cole that he has erred in his criticisms, but to give further proof, I will say that the ordnance officer of the Department of the Platte, in which the regiment to which Lieut. Cole belongs is stationed, has a reputation for efficiency, courtesy and an earnest desire to do all in his power to perfect the equipments of all branches, which is well deserved. I have personal knowledge also that his efforts have been greatly hampered by the fact that cavalry officers seem unable to agree upon just what changes are necessary.

Had Lieut. Cole been with his regiment during the Pine Ridge troubles, the only winter campaign in the north for some years, he would have seen one of the finest equipped regiments for field service in winter, so far as clothing, arms and everything but transportation goes, that could be found in any cavalry the world over.

The men were supplied with blanket lined canvas overcoats, fur caps, fur gloves, heavy German over socks and arctic overshoes. Not a man could have provided himself with so comfortable an outfit at any trader's store in the country.

Lieut. Cole seems to be ignorant of the fact that after trial in the hands of six troops, the self-acting, cal. 38, Colt's revolver he mentions, has been adopted by the Ordnance Department; that officer's spurs have been manufactured by that Department for several years, and that a new model spur is now being issued to troopers.

It is so seldom that any cavalry officer has an article in the JOURNAL, that I hesitate about making any remarks upon it. I believe however that Lieut. Cole has been misled into making his sweeping assertions about the two staff departments by careless talk of other officers about "old times," and that he is fair minded enough to accept friendly correction at the hands of one of his own regiment.

Lieut. Jas. A. Cole, 6th U. S. Cavalry.

In the Lyceum paper on the cavalry equipment published in the November issue of this JOURNAL, an attempt was made to discuss the subject on the basis of the following definition: "The cavalry equipment is made up of what a cavalryman has to take into the field, to enable him to live in campaign, march, and fight—all to the best advantage." (p. 1076) This paper has received some little criticism, some of it based on rapid reading, so a reply in detail will be ventured, with a view to explaining statements evidently misunderstood for want of clearness in writing on the part of the author.

To begin with Major Harris' comments. The major does not understand what is meant by the carbine's being "buttressed into unwieldiness," etc. It means this. There is no necessity for the carbine's being made bulky to carry on the saddle, and heavy and clumsy to handle mounted, simply to enable a cavalryman to go through an infantry manual of arms without breaking a stock. A proper saddle weapon cannot be made to gee with the present manual. The weapon would seem to be the more important.

The cavalry wants a light, easily handled, long-range carbine that will enable cavalry, *if necessary*, to reply effectively to the fire of infantry at all except the extreme

ranges. The last would be desirable also but we cannot carry a long enough gun on the saddle for the purpose.

Major Harris says: "The buck-horn suggested would not stand field service, even with a slight protector."

The buckhorn aperture was suggested because the author had seen it in long continued and successful use. The suggestion was further that the sight be used only when raising sights was unnecessary. The "buck-horn" brazed to the barrel lasts *as an effective sight* as long as the gun.

The major makes me advocate a front sight of bone or lacquer. This is what I want. How is that going to break? If it does, we have left as good a sight as we have now: if it does not, a better.

The statement "The sling of webbing 'one inch wide' would become a string after a few weeks use." I have no more means of disproving than the major has of proving; but the Mills webbing belt seems to wear well. Webbing of the best quality is undoubtedly light, very strong and durable. There certainly would be no strain put upon the sling except in mounting and dismounting unless a charging loop is used.

This is the bit had in view in the "queries." It should have been described more at length.

Major Harris suggests that the only object in shortening the sabre being to get nearer the enemy, a poniard might do better. It may be argued on the other hand that a long sabre being a good thing, a lightning rod would be an improvement.

The idea that prompted the suggestion is that a shorter, straighter, stiffer weapon, with the centre of gravity nearer the hand, can be handled easier and a "point" delivered to better advantage than with a long sabre. A steel hilt, nickel plated, is not easily bent and does not require polishing, and is neater and plainer in appearance.

As to the saddle, I defy the young man shown on p. 149. Cav. Drill Regs, to keep his position on the march without having the inside of his thighs badly chafed by the projection on the McClellan tree. He will also be chafed by the cantle. Now I want to cut these rubbing places down, and I don't care to see him sit like a clothes pin to dodge being scabbed. An officer of my regiment with an eye to comfort and a Yankee turn for experiment, cut down his saddle tree and moved his stirrups forward about as suggested, and was better off—so he said—and I believed him, for I sat in the saddle.

Now as to what is military. In the general sense it would seem that anything ought to be military that will enable a soldier to do what is expected of him with the least expenditure of time, horse, man, and equipment. If green cotton umbrellas would make the cavalry a better all round fighting arm, the cavalry ought to have them. A pinola and pinoche ration was not advocated: a scientifically simple one was.

As to the sanitary objections to the sleeping bag, I would prefer crawling into a dry, and warm, if slightly odorous bed, which would go far toward insuring my being on hand when wanted, to taking chances with cold, rain, rheumatism and possible pneumonia, involving in the absence of proper hospital facilities the assistance of troopers who would be more useful elsewhere.

The gentleman who was kind enough to sketch my cinching attachment included my old Whitman saddle in the sketch. Hence Capt. Nordstrom's misapprehension. It is not intended to weaken the saddle tree—only to remove some of the bumps and extra timber.

Appreciating the fact that the horse has all the internal organs that Capt. Nord-

strom attributes to him, I believe that a light pressure distributed over a considerable area by two cinchas, is better than the usual pressure of a single cincha with the occasional accompaniment of breast strap and crupper, which are an impediment to rapid cinching and wear off hair and hide.

Referring to Lt. Smith's comments. I consider the *present* method of carrying the *present* carbine, on the whole the best. A closed boot keeps the mud out of the muzzle. A careful seat prevents cantle sores.

I once saw a Mexican carry his rifle under his right leg, muzzle to the front and lower than the butt, which projected in rear of the cantle,—not however in a way to make mounting difficult. The advantage of this position is that the man is clear of his gun while mounted, but has it at his hand as he dismounts, with a good chance of pulling it off with him even if his horse bolts with him the minute of dismounting, as has sometimes happened in our service. The effect of this position on the leg is agonizing.

The truth of the matter is that a carbine is an awkward thing to stow on a horse, and the *least objectionable* way is the best way. Lieut. Smith takes me to task for not mentioning the lariat, side lines, etc. As I never saw side lines except at weekly inspection I quite forgot to mention them. The lariat is very handy for purposes other than tethering horses, and the new one is very light and strong and more desirable than otherwise. There is no trouble in firing a carbine handily from the right front around to the left rear. I can under any circumstances point a stick at an object more accurately than I can my finger, and it comes handier to shoot a carbine off a horse than it does a pistol. Give the cavalry a five or six pound carbine with a grip that can be gotten hold of and it can be fired from the shoulder with one hand. Lt. Smith believes that the pistol is *the* weapon for mounted skirmishing, and also that 20 yards should be the limit of the effective range. Every mounted skirmish then would be a *melée*—which is not the case. The pistol in a *melée* would either be attached to a lanyard or in the trooper's hand. The trooper then would have his pistol available if unhorsed. He should not be compelled to drag around two pounds and a half of unnecessary iron while fighting on foot. The pistol belongs on the saddle. Provision should be made for attaching it to the belt in case of necessity. This suggestion was made in the queries.

Lt. Smith credits me with wishing to change the present undress uniform. I want to see the *field* uniform changed. Who has not seen a soldier in the field with blouse out at elbows, buttons off, trousers out at the seat with an improvised patch hanging by enough remaining thread to show that the wearer has at least made an effort to preserve appearances, trousers legs streaked with the remains of many a meal, and a general air of disreputableness pervading the entire man from the crown of his worn out hat to the sole of his unspeakable boots; and this good reliable soldier is in such condition because he has not had a chance to draw new clothes. A recruit looks twice as well in his first fatigue suit than in his first undress uniform. Canvas settles down to the figure, keeps cleaner, wears much longer, looks much more respectable when old and dirty, and sheds dust and rain better than kersey.

If made to fit, it would give men a very ship-shape appearance, which is all that is necessary in the field.

Lieut. Clarke comments "Lieut. Cole says that if our men were properly mounted, our men could at least equal the feats of the Germans, etc. This is a great mistake that one sees repeated again and again. * * * Give the mounts of any German squadron to the great majority of troops that I have seen in our service and they would not be fit for an Arizona stage line in one year. * * * Again Lieut. Cole says 'our men are far and away better riders than the Germans'—another piece of

popular fallacy. America has the best riders in the world, the best method of riding, and much of this is due to this very McClellan saddle that Lieut. Cole want to change."

I said "Our men, if properly mounted, could at least equal the feats of the Germans, (p 1077) being far and away better riders *naturally*."

Lieut. Clarke, in rebuttal of this, unintentionally misquotes me slightly, substantially confirms my statement, contradicts himself a little and credits me with a desire to mount American troopers on German, or similar horses.

He begins his comments by hoping that the matter of equipment will be placed in charge of commissions of officers, one for each branch of the service, and virtually commends as suitable for the time being a method of obtaining remounts that is directly opposed to his ideas on the rest of the equipment. Lieut. Clarke also says that the troopers and many officers cannot ride. The McClellan saddle is used principally in the army, therefore some of the best riders in America, even according to Lieut. Clarke, must be found there; and according to my idea, some of the very best riders in the cavalry are in ranks. I never saw a cavalry troop that did not have at least ten troopers that stood ready to take, not only a certain track prepared in a certain way on a horse trained to that track, but anything that came along.

Lieut. Clarke says very justly that our army is by no means made up of Americans. In point of fact we have many Germans, numbers of whom have served their time in German cavalry regiments, and excellent men they are; though not noticeably the best riders, or anything more than good riders. An Irishman, if he has any intelligence at all, is apt to take as naturally to riding as he does to his national peculiarities. The American farm boy, of which class we are getting a good many recruits, sits his horse with anybody, and these three classes form the bulk of the army. Most troopers succeed in making their horses do what is required of a troop horse.

Lieut. Clarke's idea of more riding, more drill and less fatigue duty, and more interest on the part of officers, is as we would all have it to be; but it must be remembered that from 1865 to 1885 our cavalry officers were many of them engaged more or less constantly in the hardest kind of campaigning, resulting in the breaking down physically of men who ought to be at this moment in the prime of life. However, there is no doubt of the availability of the youngsters from '80 on.

We would like a longer barrel for the carbine, because the smokeless powder is a slow burning powder and we must be ready to stand off infantry on occasion: hence the desirability of that extra two inches. The carbine ought *if practicable* to be attached to the man; if not to both man and horse. A charging loop could very properly be attached well down on the boot for the muzzle to swing in whenever there is danger of horse and rider parting company. When marching on dangerous footing the troop commander ought to cause the troop to advance carbine as a precaution against accidents.

As to our mounts, they are as good as the Q. M. Dept. can get and as bad as the contractors can persuade the department to accept. We ought to buy at first hand of the farmers, or breed. We do not want thorough-breds, but good, stocky, sturdy half-breds, about fifteen hands high; and we certainly don't want the big headed, flat chested, hollow flanked and greyhound-bellied war horses of which there are at present far too many in the cavalry.

As a final word on riding, that dyspeptic young critic of Americans generally—Mr. Rudyard Kipling—while treating our horses and equipment with scant courtesy, says of the American cavalrymen, "*but they can ride.*"

Lieut. Clarke's crisp comments will be read with great interest, forming as they do, an independent essay, rather than a criticism on the very humble effort under consideration.

XUM

Reprints and Translations.*

NOTES OF LECTURES ON ARTILLERY IN COAST DEFENSE.

(*Proceedings of the Royal Artillery Institution.*)

By MAJOR A. C. HANSARD, R. A., Instructor of Gunnery.

(*By permission.*)

Continued from No. 61, page 127.

PART II.—FIRE TACTICS.

THE second division of our subject is that of "Fire Tactics." Under Organization we treated of the preliminary arrangements which have to be made, in order that fire may be opened as speedily as possible at the desired objective; under this heading it is proposed to consider the answers to the questions; at what object should fire be opened? at what part of that object? and with what projectile?

As regards the first question it is obvious that to open fire indiscriminately at an enemy's vessels, each fire commander† selecting his own objective, would lead to confusion and loss of power. To obtain the greatest possible effect out of the guns, requires that their fire should be utilized with a definite aim in view, that aim being to defeat the object of the enemy, whatever that may be.

It is a principle of defensive fire tactics of universal application, that the most intense fire should, at every phase of an engagement, be directed on that part of the attacking force whose action, if successful, would most imperil the defense. In order to know what vessels of an attacking squadron it would be most necessary to direct our fire upon, we must therefore have some idea of what that squadron is likely to attempt, and in what manner they will make use of their vessels in order to accomplish their object.

Now a fleet may attack a coast fortress with a view to occupy the water area defended by it, temporarily, while a force is being landed or permanently, in order to use the harbor or anchorage as a naval base, or as a base of operations for an invading army. An army would, it is true, be probably landed at some undefended part of the coast, but unless a port in its

* Please address communications concerning reprints, translations and reviews to Lieut. J. C. Bush, editor of this department.

† Since the first part of these notes was printed, the designation of the Fort Commander has been altered to "Fire Commander"; and that of the Sub-Commander for discipline to "Group Commander."

neighborhood were seized the operation of supplying that army with the necessaries of war would be very precarious.

Again, a fortress may be attacked with a view to destroying a dockyard or shipping sheltered behind its guns, and also for the purpose of seizing stores of coal, etc.

Lastly, the attack may be made simply with a view to the moral effect produced on the defenders, or to distract their attention from some other point of the coast line.

The method of attack will vary somewhat according as the fortress defends a roadstead open to the sea, or a channel giving access to a harbor or the mouth of a river.

If the object of the attack is to occupy defended waters, it is obviously necessary that the guns bearing on those waters should first be silenced; and, if the occupation is intended to be permanent, the forts must be rendered untenable by the defenders; this may be accomplished either by bombardment from the ships alone, or, more usually, by a combined attack from land and sea.

Where the defended water is an open roadstead, whatever the object with which it is attacked, that attack must take the form of a bombardment; since the object will have to be accomplished in water covered by the fire of the forts.

In the case of a channel leading into a harbor, or the mouth of a river, if the object is to seize or destroy material or shipping beyond the forts, it would not always be necessary to bombard these forts. Armored vessels, if able to pass the forts at speed, might well afford to neglect their fire; and it is to prevent this action on their part that channels are protected by submarine mines, booms, and other obstructions; so that ships may be delayed under the close fire of the shore guns. These obstructions would therefore have to be first dealt with by the enemy; and, when a channel through them was cleared, the ships would probably attempt to run past without returning the fire of the forts more than would be necessary to render that fire less accurate; and when conditions were favorable, to cover themselves with their own smoke.

It seems probable, however, that these tactics would only be attempted when, having passed the forts, ships could reach safe positions out of the fire of the guns on shore; for, should a ship run past forts at the entrance of a harbor only to find herself engaged by inner defenses, she would run the risk, should that engagement go against her, of having to repass the entrance forts with her fighting efficiency seriously impaired, and so perhaps be hopelessly crippled in getting out. But if she is able to get to safe waters beyond the forts, she could probably rely on getting out again with as little damage as she sustained in getting in.

There are thus two forms of attack by ships to be guarded against, "bombardment" and "running past," and these might be used in combination.

Some authorities hold that no bombardment of forts by ships is ever likely to be again attempted. This opinion seems to be arrived at from a consideration of the difficulty of the task of silencing shore guns, in well-

constructed batteries; and also from the fact that, with modern range and position-finding instruments, the accuracy of the fire of those guns has been enormously increased. This latter advantage has not been counterbalanced by any corresponding advance for guns afloat; the difficulties of finding the range, and of obtaining accurate fire from an unsteady gun-platform, having still to be overcome.

However, even in the days before rifled ordnance, the superiority of shore guns was recognized, and it used to be laid down that a battery of four guns well mounted, should be able to give a good account of a 120-gun ship; bombardments were attempted and successfully carried out in those days and so may possibly be again. At any rate as gunners we are more concerned with the methods by which we may hope to successfully resist such an attack, should it occur, than with the question of its likelihood; and by being well prepared to meet it we shall render its attempt less probable.

Should then an enemy decide to seriously engage the forts, it is probable that he will bring his ships to as close a range as possible, for it is only by coming to close range that he can hope to make good practice; and since the fact of bombardment being resorted to presupposes a great superiority in guns, and consequently a large number of ships, it will be necessary for them to anchor, as at close range they would not have room to manœuvre.

At Alexandria the fleet commenced the action at very long ranges and in motion, but finding that their fire was not very effective under those conditions they anchored, still at considerable ranges; but as a matter of fact the damage done to the armament was not heavy, and it has been stated that of the guns which were silenced only three could not have been remounted in time to renew the action the following day; so that, had the defense been determined, it would probably have been found necessary to renew the bombardment at a closer range.

In the American Civil War at the Federal attack of Fort Fisher the first bombardment, lasting two days, was a failure in spite of the fact that the fleet consisted of some sixty vessels carrying 619 guns, while Fort Fisher only mounted 44 guns in all, of which 24 were on the sea front. In the second bombardment which lasted four days, the fleet came in much nearer, and each vessel was told off to attack a certain gun, the range to which from its station was previously ascertained; the guns on the land front were completely silenced, 16 being rendered *hors de combat*, and the place, after resisting one assault, fell to a second assault by an overwhelming force from the land side. Confederate accounts state that 50,000 projectiles were thrown into the fort by the fleet.

Every effort should be made to open an effective fire on the fleet whilst advancing to take up its positions, as it is during this period that the forts will have the advantage over the ships; and, by a well-directed fire, the plans of the enemy may be so deranged as to prevent some of the ships reaching their assigned stations; besides which it is of importance to draw the fire of ships as early as possible so as to exhaust their ammunition, their supply of which must necessarily be limited.

A question to be considered is whether the fire of the shore guns should

be concentrated on a few ships or distributed over the whole fleet; generally speaking the best method would appear to be, to concentrate on a few ships, preferably those at shortest range or which had succeeded in causing most annoyance, with the greater number of guns; distributing the fire of the rest sufficiently to cause a feeling of insecurity and consequent loss of accuracy; it would certainly be preferable, whilst the fleet was in motion, to totally disable one ship rather than to inflict slight damage on several.

Whenever two or more forts can bring a cross-fire to bear on a ship, she should be attacked by those forts, as it will prevent her taking her station in such a position as to be secured from dangerous hits.

A large part of the secondary and movable armaments should be used to keep down the fire of the auxiliary armament of the ships (quick-firing and machine guns) which would be directed at the embrasures or ports to prevent the guns being worked.

High-angle fire from guns of the primary armament specially mounted, and from howitzers of the movable armament in concealed positions, would be especially dangerous to ships at anchor; and, when a sufficient number of them are available, it would perhaps be advantageous to withdraw the gunners from the direct-fire guns as soon as the fire from the ships began to tell, until the howitzers had succeeded in somewhat reducing that fire.

Ships can make no effective reply to this kind of attack unless they have vessels specially constructed to carry howitzers; and even then, since the vessels must be visible from some point on shore, while the batteries may be so placed as to be invisible from the sea, it is difficult to see how the ships could observe their fire and correct their ranges with anything like the accuracy attainable by the shore batteries.

Should the enemy's fleet only wish to bombard the fortress with a view to producing moral effect, or to divert the attention of the defenders from some other operation which is being simultaneously attempted; such as landing troops, destroying mines or other obstructions, or the attempt by other vessels to force a passage; the ships engaged in the bombardment will not commit themselves to a serious engagement, and, in order to minimize the risk of being crippled, will keep on the move.

In view of the fact that accurate fire can now be directed on objects in motion, we should be able to compel such vessels to keep at so long a range that their fire cannot be very accurate or much to be dreaded.

It should be noted, in considering the kind of attack to which any coast fortress is liable, that the amount of risk to which attacking vessels would be willing to expose themselves, would depend in great measure on the distance from their base, and the possibility or otherwise of their being attacked on their way there to refit, by hostile vessels; the further off the base and the greater the probability of such attack, the less likely are they to run serious risk of being crippled in attacking coast defenses.

A bombardment by vessels in motion would, as has been said, be usually resorted to for the purpose of covering some other operation; while therefore replying to it sufficiently to keep the vessels at a distance, and to prevent such an attack from becoming dangerous in itself, the main power of

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the defense would be directed to defeating the ulterior object of the enemy. Should this object be the landing of a force, arrangements should be made to keep up as heavy a shell fire as possible on the landing places and their approaches; for this purpose a large part of the secondary armament (and possibly a portion of the primary armament) should be held in reserve, as also batteries of movable armament. These guns should not open fire until the boats carrying the landing parties are within effective shrapnel range, so that they may not prematurely show their position and draw on themselves the fire of the fleet. As the boats near the landing the fire from the ships must necessarily slacken and then the heaviest possible fire should be opened from all available guns on the boats.

Ranges from forts and from the positions of the movable armament to landing places would be ascertained beforehand, and group officers would be provided with charts showing the fire-area of their guns and these ranges, so that if they have to act independently they may still be able to keep up effective fire. Infantry and machine guns would be used to assist in the defense.

The conditions necessary for a successful attack by landing parties are that the garrison should be taken by surprise, or that the attacking force should be superior in numbers and the defenders shaken by a preliminary fire from the ships (these were the conditions which resulted in the fall of Fort Fisher); the best way to obviate this is that the defenders should not unnecessarily show their positions and that the enemy's ships should be kept at such a distance as will insure their fire being effective.

The destruction of mines, or other obstructions in the channel, would usually be attempted by boats under cover of darkness, fog, or the smoke of the ship's guns (as was successfully done at Milford Haven). In the first instance this attack would be resisted by boats of the defense, but if these were unsuccessful they would draw off behind the obstructed channel, leaving the further defense to the artillery. Quick-firing and machine-guns are the best weapons for this purpose, but they would be assisted in most cases by other guns of the secondary or movable armament. If the attack takes place by daylight, or if the electric-light can be used, the enemy's boats would be attacked by the ordinary methods of fire control; but if, by reason of fogs, etc., the boats cannot be seen, other means have to be adopted. For this purpose the mine-field (or obstructed channel) is divided into portions, and to each portion certain guns are allotted; the range and training to the centre of its portion and length of fuse are ascertained and painted on the range-board or side of the gun-carriage. Elevation is given by index-plate or other means of giving quadrant elevation; or, if the guns are not so fitted, by clinometer, in which case the elevation in degrees and minutes, taking into account the height above the water, must be calculated (all converted 64-pdrs. and 80-pdrs. now have planes cut on them for using the clinometer). The training must be arranged for when there are no arcs, by marking the racers, or by nailing battens or painting lines on the platforms against which the trucks, or wheel and trail, can be brought at each round, so that the guns will point in the required direction; or laying-back points may be established. Great accuracy of laying for line is not however neces-

sary. A previously agreed upon signal would show when the defended area was clear of the defending boats, when a rapid fire of shrapnel (and case shot from guns within case shot range) would be opened.

Should an attempt be made by a squadron to force the passage of a channel, whether under cover of bombardment or not, every effort would be made to so disable the leading vessel or vessels as to cause a check in the advance of the squadron, and detain them under fire of the forts. An instance of the effect such a check would have, occurred during the battle of Mobile Bay, 5th August, 1864.

The Federal fleet consisting of 14 wooden vessels and 4 monitors under Admiral Farragut succeeded on that day in passing Fort Morgan which defended the entrance to the bay. The deep water channel was partially blocked by torpedoes so that vessels would have to pass close under the guns of the fort. The fleet advanced in two lines, the wooden vessels, lashed together in pairs, forming one line, and the monitors the other; these being on the right of the wooden vessels and between them and Fort Morgan. When opposite the fort the leading monitor, the *Tecumseh*, bearing too much to the left, was sunk by a torpedo, and the alteration in her course also caused the leading wooden vessel to come on to the line of torpedoes, on perceiving which she stopped, thus throwing the whole line into confusion and checking their advance under the guns of the fort; the check lasted about ten minutes, till the flag-ship taking the lead passed in safety over the torpedoes, and the whole line straightening out again, passed beyond the fire of the fort.

Reports by Federal officers show that the damage and loss of men caused by the fire of the fort, and of the Confederate gunboats, during the check was very heavy, and they state that had it lasted a few minutes longer the attempt would probably have ended in disaster.

In resisting such an attack, then, it seems that the best policy would be to attack the leading ship, or ships, with every gun that can bear on them; and that the object should be to attack the "vitals" of the ship rather than to inflict losses on the crew or damage the armament.

In a lecture* Captain May, R. N., states "that probably the oldest ironclads as being the least valuable, would be employed to lead the line"; this should make the task of stopping them easier for us, as such ships are not usually provided with such heavy armor as more modern vessels.

High-angle fire, on account of its comparative inaccuracy, is not of much account against vessels in rapid motion; but where a channel has a narrow part, such that a vessel passing through must keep approximately to the centre of it, and therefore at a known range, salvos might be fired at her as she passed that point with good effect.

While the main effort should be directed to stopping the leading vessels, it would not be well to entirely neglect the others, since it is always advisable to draw the fire of ships, and cause them to exhaust their limited supply of ammunition.

Should the forts be successful in checking the advance, the fire should

* Published in R. A. I. "Proceedings."

then be distributed on the fleet, with a view to doing as much damage to the armament and inflicting as heavy losses as possible on the crews during the time that they remain under the fire of the forts; any vessel absolutely stopped, might safely be left to be dealt with by the high-angle guns, if there are any.

The choice of the objective on which fire is to be opened by forts, rests with the section (or sub-section) commander, who will indicate to each fire commander the vessel he wishes him to attack, and in some cases will also give orders as to the effect which he wishes the fire commanders to produce, viz.: whether the ship is to be stopped or the armament to be attacked, etc. Fire commanders should however be prepared to act independently should circumstances require it; such as, for instance, a breakdown in the means of communication with the section commander. Therefore fire commanders must have a thorough knowledge of the general scheme of defense as far as the action of their own fort is concerned.

As an action progresses, if the enemy's fleet is partially successful, and the attack pushed home, the tactical control will tend more and more to fall into the hands of subordinate commanders, and eventually into the hands of group officers; these officers must therefore be prepared to undertake the responsibility. At this stage of an action there would not be much opportunity of choosing the objective, and they would have to fight their guns at any object they could see; a thorough knowledge of the water area covered by their group and of the proper projectiles to use against various objectives is therefore essential.

The control must never be allowed to pass out of the hands of group officers into those of the gun captains. Good effect can only be produced by concentration of effort, and the longer the control can be kept in the hands of the commanders of the larger units the better the effect will be; if allowed to fall into the hands of gun captains all power of concentration is lost and it is only by chance that any good effect can be produced.

The question, "at what ship shall we fire?" having been decided, the next consideration is what damage shall we attempt to inflict on her? in other words, what part of the ship shall we try to hit and what projectile shall we use? In order to decide the answer to these questions some knowledge of the construction of war-ships is necessary.

In the first place we may note that it is of no use studying the vessels of our own navy, since we shall not have to engage them; nor is it necessary to consider the navies of the lesser naval powers, since they are unlikely to be brought against our fortresses, nor do they present any great peculiarities; the only navies which it is necessary to consider as affording distinct types are the French, Italian, and Russian; and this much reduces the difficulty of the task.

It is as well clearly to understand that as a general rule ships are built, not to attack coast defenses, but to fight other ships. Their weapons are guns, torpedoes and the ram, of which the two latter are useless against coast defenses. The armament is divided, much as coast armament is, into primary armament, consisting of a few heavy armor-piercing guns, the secondary battery, serving the same purpose as our secondary armament,

and the auxiliary armament of light quick-firing and machine-guns, roughly corresponding to our movable armament.

It is, of course, essential that a ship should be able to float, steer and steam throughout an engagement, therefore her "vitals," that is her engines and boilers and her power of flotation are protected by side (vertical) armor or by a protective deck at or near the water-line (horizontal armor) or by a combination of the two. It is also desirable that her armament and crew should be protected, but this is not so essential as the protection of her "vitals," since even if her guns are silenced, provided she can steam at speed, and her stability and steering gear are intact, she can hope to defeat her enemy with the ram or torpedo.

In the earliest ironclads we find that complete protection was afforded to the "vitals" and the armament by casing the whole hull in armor, but as the power of guns increased, it was no longer possible for ships to carry the enormous weight of armor necessary to thoroughly protect the whole hull; we therefore find that certain parts of the ship are left unprotected, the armor being concentrated on the water-line and on a central citadel containing the most important part of the armament.

Further increase in the power of guns, and consequently of the weight of armor to be carried, rendered the abandonment of the citadel necessary; so that in general, we may say that, in modern foreign ships, the vitals are always protected; the primary armament is either completely protected, by being mounted in turrets, or partially so in barbettes; while most usually the secondary armament is completely unprotected. The auxiliary armament has only the protection of bullet-proof shields, and is generally mounted on the upper deck and in military tops. Breech-hoods are sometimes added as a protection to the crews of B. L. guns, mounted *en barbette*, and in some few cases guns have been mounted on disappearing carriages.

There are several points which it is desirable to know as regards ships, such as their speed, draught (which limits the positions on the water area in which they can place themselves), length and breadth (which define the size of the target offered), appearance, and the nature and disposition of the armament; but the all-important considerations with regard to the question we are now considering are: what is the *nature* of the target offered? how far is it vulnerable to our fire? and what is the most advantageous portion to attack? and these questions can be answered when we know the thickness and disposition of the armor.

From this point of view the battle-ships, coast defense vessels and gunboats of the French navy can be grouped into three main divisions depending on the disposition of the armor; all of them have complete water-line protection by side armor, and some have in addition armored decks.

These three main divisions are, first, central citadel ships, second, turret ships, and third, barbette ships. The first division, which includes most of the older efficient vessels, provide more or less complete protection for the principal part of the armament; we will take as an example of this division the *Courbet*; this vessel has a water-line belt five feet above the water and five below, fifteen inches thick amidships tapering to ten inches fore and aft; there is an octagonal citadel in the centre, having 9.5 inches of

armor, in which are mounted four 34 cm. 48-ton guns so arranged that two can fire ahead, astern, or on each broadside; there are four 27 cm. 23-ton guns, two in barbettes unarmored on the top of the citadel and one each at bow and stern unprotected; also six 3-ton guns unprotected. There is a steel deck about the water level of 3.25 inches. The whole of the unprotected armament (10 guns) can be put out of action by any guns able to reach them, whilst the primary armament is vulnerable to 10-inch R. M. L. guns, either broadside, or end-on at ranges under 2000 yards or to 6-inch B. L. guns at 1500 yards; while the water-line armor at its thickest part would be penetrated by the 12.5-inch R. M. L. or 9.2-inch B. L. at 3500 yards; also the hull above the water-line could be seriously damaged by common shell from medium guns over two-thirds of the length of the ship.

As an example of the second division turret ships, we will take the *Bouvines;* this vessel is not yet completed; she will have a belt of a maximum thickness of 18 inches, a steel deck probably 4 inches. The primary armament of two 34 cm. guns is disposed in two turrets, fore and aft, armored with 17.75 inches. The secondary armament of four 10 cm. quick-firing guns is unprotected; there are strongly armored ammunition hoists to the turrets; she is classed as a "coast defender." Her armor is beyond the power at 2000 yards of any guns below the 16-inch R. M. L. or the 10-inch B. L., but common shell entering below the turret and above the belt would possibly render the turret guns useless; the whole of the hull above the belt, including the secondary armament, is vulnerable to shell fire of light guns.

For an example of the third division, barbette ships, we will take the *Marceau;* this vessel has a water-line belt varying from 18 inches amidships to 12 inches aft, her primary armament of four 34 cm. 52-ton guns is carried in four barbettes armored with 16-inch armor and provided with hoists having 9-inch armor; they are placed one forward and one aft and two on sponsons amidships; her secondary battery consists of eight 14 cm. 2½-ton guns on each broadside and one at the bow all unprotected; she has a 3.7-inch steel deck. Her water-line armor is penetrable by the 10-inch B. L. gun at 2500 yards; her primary armament could be disabled by direct hits on the guns themselves or by shells entering beneath the barbettes and above the belt, or by high-angle or plunging fire of any guns, while her secondary battery is vulnerable to any guns. The greater part of the French battle-ships and gunboats consist of vessels which may be placed in this division.

Each of these main divisions includes several sub-divisions, the ships in which differ in the thickness of armor carried and in size; but the disposition of the armor and armament is approximately the same throughout the division.

Of Russian ships there is one small class consisting of three vessels, the *Catharine II.*, *Tchesmé*, and *Sinopé*, which are built on a design peculiar to that navy. They have a belt varying from 16 inches to 8 inches; above the belt is a citadel with 12-inch armor on the sides, 9-inch and 10-inch on the bulkheads; on this again is a pear-shaped redoubt, 12-inch armor, and on this are three barbettes, 14-inch armor, two abreast forward and one aft; in

each barbette are two 50-ton guns, in the first two the guns are on disappearing carriages, in the last the guns are on ordinary carriages; there is a 3-inch steel deck; the secondary armament of seven 6-inch guns is outside the citadel, four in front of it and three astern. The primary armament can only be attacked by high-angle or plunging fire or by guns capable of piercing 14 inches of armor; the secondary armament is partly protected from end-on fire by the citadel, but is wholly vulnerable to broadside fire. On the whole these vessels would probably sustain less damage to their armament in an action with coast defenses than any yet described; but, as they are stationed in the Black Sea, would probably not be employed against any of our home fortresses. The two circular ironclads, *Novgorod* and *Admiral Popoff*, constitute a type peculiar to Russia, but stand the sea so badly that they could not leave the Black Sea and need not be described. For the rest the Russian vessels do not differ much from the French, except that in two belted barbette ships, the *Nicolai II.* and *Aiexander II.*, the secondary battery is protected against end-on fire by armored bulkheads and a gun at each end of the broadside battery is protected by thin side armor.

The peculiarity of the Italian ships is that they do not have complete water-line belts, but rely for protection of the vitals on armored decks. There are roughly two divisions, viz.: central citadel ships and barbette ships. Of the central citadel division some carry their principal armament in turrets, some in barbettes.

The *Dandolo* and *Duilio* are of the former class; they have a water-line belt of wrought-iron 21½ inches thick for about one-half of their length, on this a citadel and over that two turrets, 18-inch armor, placed diagonally, the principal armament being four 100-ton R. M. L.; the small secondary battery of three 12 cm. B. L. is outside the citadel.

With these ships the thickness of the armor would render its attack by the guns usually mounted on shore hopeless, but the very large unarmored target could be completely destroyed and the ship probably fatally crippled. The *Sardegna* is an example of the barbette type; she has no side armor; her primary armament of four 67-ton B. L. guns is carried in two barbettes, 18-inch compound armor, to which there are armored hoists; there is an armored deck; the secondary battery, unprotected in any way, consists of eight 15 cm. and six 12 cm. guns. This ship seems very unfitted to engage coast guns; the small armored target would not be worth firing at, as the ship could probably be placed *hors de combat* by common shell.

It is impossible in the limits of a lecture to give even the shortest account of all the various types to be found in foreign navies; those described have been selected as being fairly representative of their class.

Besides battle-ships and gunboats there are in all navies armored and protected cruisers; the former having vertical, the latter only horizontal armor. None of them are likely to engage coast-defenses; in the armored class the armor is too light to ensure protection against the lightest armor-piercing guns, and with very few exceptions the armament is entirely unprotected.

Before we can determine on the rules which should guide us in the

choice of a method of attacking a ship of given type, we have to consider the powers and uses of our projectiles.

First, as regards the attack of armor. Armor, as applied to ships, is of three kinds, viz.: wrought-iron, steel, and steel-faced iron, usually called compound; these three varieties behave differently under attack.

Wrought-iron yields locally; it is punched or perforated, a clean hole being made in it. The entire shield is generally capable of resisting a subsequent blow as stoutly as it resisted the first. Partial penetration is practically useless, however often it may be repeated.* It is obviously therefore useless to attack this species of armor unless the power of the gun is equal to driving its projectile through the armor.

A measure of the power to penetrate is given by the rough rule that, in order to penetrate its own diameter into wrought-iron, a shot must strike with a velocity of 1000 f. s., and its penetration with greater or less striking velocity will be in proportion; thus, a 10-inch shot striking with 1000 f. s. will penetrate ten inches of wrought-iron armor, with 500 f. s. it will penetrate five inches, and so on.

This rule gives the penetration which may be expected when the shot strikes the plate in a line normal to its surface; when it strikes at an angle, the thickness of plate that can be perforated is in proportion to the sine of the angle at which it strikes; thus, it may be useful to remember that striking at 60 degrees to the surface a shot will penetrate roughly six-sevenths of the thickness it would penetrate at the normal. Below 50 degrees the shot will glance from wrought-iron; from hard armor the shot will glance below 65 degrees.

Steel-faced and steel, called "hard" armor, yields by fracture, the plate cracking radially from the point of impact, these cracks extending through the thickness of the metal in the case of steel (soft steel, however, occasionally has been perforated, behaving more like wrought-iron). These armors not admitting of perforation, as a rule,† can only be destroyed by repeated blows, cracking, and stripping off the plate. Though a heavy gun with a single shot may not effect much against them, repeated blows from lighter guns may succeed in destroying the armor and eventually penetrating the ship's side. This, at considerable range, or against a ship in motion, would obviously be a difficult task to accomplish. In the table of penetrations given in the Tactical Manual, a note states that damage equivalent to penetration would be effected against hard armor of the same thickness as wrought-iron, which would be just penetrated by the gun; it is important to understand the bearing of this. In the case of iron armor, the shot penetrating, though it only damages the plate at the point of impact, will probably do serious damage to whatever is behind the plate; whilst with hard armor no such damage will be done, but the plate will be less able to resist a subsequent blow.

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* "Attack of Armor." Captain Orde Browne. Vol. XV., p. 308.

† Major MacMahon, R. A., gives the following rule for ascertaining the penetration of compound armor by *steel* shot. The penetration is equal to four-fifths of the calibre of the shot for every 1000 f. s. striking velocity. Thus, the steel shot of the 10-inch B. L. gun will penetrate 8-inch compound armor with 1000 f. s. striking velocity.

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It should be remarked that a shot which only just gets through the armor may not effect much damage, since its energy will have been almost entirely destroyed, and it may still have to pass (probably if a Palliser shot in a broken condition) through obstructions, such as coal-bunkers, bulkheads, etc., before reaching a vital part of the ship.

Horizontal armor may be attacked by direct fire provided the angle of descent is over 10 degrees and the striking velocity sufficient; the penetration at this angle being about one-fourth of that obtainable with an equal velocity by a direct hit on vertical armor. The angle of descent depends on the range and on the height of the gun above the object; tables, an example of which is given in the Tactical Manual, must be worked out in each fort, according to its height above the water. It must be remembered that the armored deck is usually about at the level of the water, and that there are generally one or more decks above this, so that the shot will have to pass through obstructions, losing some of its force before it reaches the armored deck.

Common shell can be used against thin wrought iron armor, the perforation being equal to half the diameter for each 1000 f. s. velocity*; but the backing would greatly impede the further course of the fragments; in this case the shell should be plugged.†

As regards the attack of armored docks by high-angle fire, the same rules for finding the penetration apply as in other cases. Steel shot are the best projectiles for this purpose, as they are less liable to break up when striking an object not truly point first, than are Palliser shot. Shot would, of course, be very liable to be deflected by upper works of the vessel before reaching the armored deck, and so may strike in any position.

The attack of unarmored ships, or unarmored portions of armored vessels, would be carried out with common shell when it is desired principally to inflict damage on the vessel and its armament; and by shrapnel when it is desired to cause losses among the crew. Common shell plugged have been found to explode when passing through thin armor or the sides of unarmored iron ships, and Capt. Nash, R. A., has therefore proposed to use them with plugs in preference to fuses, but, as has been pointed out by Capt. May, R. N., the time taken for a fuse to act and for the shell to burst will be long enough to allow it to penetrate unarmored sides, while there are many objects on deck—funnels, spars, etc.—which, while offering sufficient resistance to set in action the fuse, would probably not explode a plugged shell. It would be best then to lay it down as a rule that common shell be fired with percussion fuses, but as an exception at short ranges, when we can make sure of hitting the side, they *may* be fired plugged.

Shrapnel is used as a man-killing projectile, and has been found to break up well, in passing through a target of one-inch iron representing the unar-

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* Captain Orde Brown. Vol. XIV., p. 131. It is not quite clear whether this measure of the power to penetrate is intended or not; "Text-Book of Gunnery gives "half the diameter at short ranges."

† The resistance offered by armor, approaching the thickness which the shell can penetrate, would check its velocity so much that a fuse would act before penetration was complete; in the case of unarmored sides, the resistance would not be sufficient to cause this check.

mored portion of H. M. S. *Shannon*, when fired plugged. The same remark as in the case of common applies here also, so unless we can make sure of hitting the side, it would be safer to use percussion fuses. Time shrapnel could never be used with good effect against vessels in motion from heavy guns; the range prediction has to be made before the fuse is bored or set, and consequently the time that would elapse during the boring of the fuse and loading, etc., the gun, would make the chances of the shot being successful very small. Time fuses could be used, however, advantageously against ships at close ranges at anchor, when it is desired to clear the upper decks and tops of small-arm men, and crews of machine guns.

The auxiliary armament of quick-firing guns being behind bullet-proof shields, must be attacked by common or percussion shrapnel.

Open boats would be attacked by time shrapnel or by case-shot when within effective range of that projectile. Torpedo boats would probably have to be dealt with by quick-firing guns of the lighter natures; common or percussion shrapnel may be employed against them, or heavy time shrapnel at close ranges, and even case-shot.

The proportions of the various projectiles supplied are for R. M. L. guns unsupported by secondary armament, 15 shrapnel, 10 case, and 40 each common and Palliser, while, if so supported, they have no shrapnel or case, and 50 each common and Palliser. For B. L. guns a larger proportion of common to Palliser is supplied*: they have no case.

We can now sum up these various considerations, and arrive at rough rules for our guidance in the choice of the portion of a vessel to be attacked, and the best projectile to attack it with.

Speaking generally, the choice as regards the portion of ship lies between the armored and unarmored part, and as regards the projectile between armor-piercing shot and common shell. Now, from a consideration of the distribution of armor in foreign ships, it is evident that most of them can be very heavily damaged by attacking the unarmored portion. Besides the armament and crew, there is a great deal of subsidiary machinery, communications, etc., which is unprotected in all ships, so that every shell bursting between decks is sure to more or less cripple the fighting efficiency of the ship; and in proportion to her distance from her base, so would any ship be unable to endure more than a certain loss in guns, men and material. From a consideration of the nature of armor, we see that unless the shot can do more than merely penetrate it, or unless we can get several successive or simultaneous hits on hard armor, we cannot expect much damage to result to the "vitals" of the ship. Again, the target offered by the armor is a difficult one, consisting as it usually does of a narrow belt, never more than five feet, and in some cases only one foot nine inches above the water; and of one or more patches at different parts of the ship; whilst the unarmored portion offers a large target, bearing a proportion of from 3 to 2 to 4 to 1 of the armored target in most vessels. On the other hand, a shot passing through the armor belt and reaching the engine-room or boilers *may* stop

*Except with 9.2 inch, which has an equal proportion of the two.

the vessel (the *Huascar* was *not* stopped by a shell which reached the engine-room, killing and wounding four of the staff employed there) or *may* blow up the magazine. On the whole, therefore, it seems decidedly preferable to attack the unarmored portion; at any rate, with the greater part of the armament; while a few heavy guns may attack the armor when *well* within their power, and at a range where close shooting may be relied on—say 1000 yards with M. L. guns.

One case was pointed out where it would be preferable to attack the vitals of a ship, viz., in attacking the leading ship of a squadron attempting to force a passage; and then for the reason that the fire of the forts having to be distributed over a number of ships, unless by stopping or checking their progress we can gain a little time in which to fire at them, we shall not be able to inflict damage, on the greater number, sufficient to cripple them. This reasoning would not apply to one or two vessels attempting to slip past; the fire of a large number of guns can be concentrated on them, and even in a very short time they should suffer so much in crews and armament that they would become easy prey to any small gunboats or torpedo boats which could follow them up.

As to the armament of a ship, her secondary battery and auxiliary armament would probably cause us most trouble, and therefore should be first attacked; primary guns in barbettes can be usually rendered useless by the explosion of heavy common shells beneath the barbette. If there is a weak point in the ship, as for instance the absence of armor on the hoists in a barbette ship, that weak point should be attacked.

We can now give rough rules as a guide for fire commanders in the attack of ships.

1. Fire should be opened at as long a range as possible with common shell and percussion fuse, unless the armored deck is *well* within the power of the gun at that range.

2. When the range has decreased to the point at which penetration of the armored deck may be reasonably expected, use armor-piercing projectiles until further decrease of the range causes the angle of descent to fall below ten degrees. If no penetration can be attempted, use percussion common at the deck till this angle of descent is reached.

3. When the armored deck can no longer be attacked (by direct fire), use percussion common at the unarmored portions of the vessel. A part of the secondary armament, or one or two groups of heavy guns where there is no secondary armament, should employ percussion shrapnel at the upper deck and at the secondary battery (percussion or plugged).

4. When the range is further decreased to the point at which the guns are *certainly* more than a match for the vertical armor of the ship (taking into account the inclination of her course to the line of fire); and at which (taking into account the size of the armored target) there is reasonable hope of hitting it, use armor-piercing projectiles at that armor, for preference choosing the belt to fire at.

5. The attack of the unarmored parts of the vessel by percussion common and plugged shrapnel should be continued simultaneously with the attack of the armor, the latter task being allotted to a portion only of the

heavy armament. (Common may be used plugged when the range is such that there is little likelihood of missing the side of a ship.)

6. Quick-firing and machine and field guns should be employed to keep down the fire of the auxiliary armament in the tops and on the upper deck; and at close ranges to fire at the ports, and where the height of site admits, into the barbettes.

7. At close ranges time shrapnel should be used to clear the decks and prevent the working of guns in barbettes of stationary vessels.

8. Against armored cruisers of the type of the *Depuy-de-Lôme* (viz., having completely armored hulls or other lightly armored vessels), attack as above, except that, when the range is such that penetration of the armor by common shell may be expected, use that projectile, plugged, against the armor.

The same general rules govern the choice of projectiles for high-angle-fire guns as for direct-fire guns.

Howitzers of the movable armament would occasion much damage, especially to barbette ships, by a fire of percussion common, but could only, as a rule, be employed against stationary vessels; or by laying on a spot at a narrow part of the channel over which the vessel must approximately pass.

It is not expected that fire commanders will be able to employ formulæ and remember rules to any great extent during action; to aid them, therefore, tables will be supplied containing the names of all vessels likely to be engaged (a separate table for each nation), divided into types. These tables will give a general description by which the type may be recognized, information as to dimensions; nature, thickness and distribution of the armor; nature and distribution of the armament; and any special points, such as parts of the vessel particularly open to damage; thus far the tables would be of general use, for each fort must be added the ranges at which the armor becomes penetrable by the guns of the fort, and the general lines on which the fort commander should conduct the action, having regard to the power of his guns and the conditions imposed on the vessel by the particular circumstances of the water area.

The section commander, when pointing out to a fire commander the particular vessel which he is to attack, will also, as a general rule, inform him of the type to which that vessel belongs, and, if possible, the name (or number on the list) of that vessel; so that the fire commander, referring to his list, will be able to see at a glance the general idea of the form which his attack should take. To enable the section commander to do this, an officer of the navy, or other person competent to recognize foreign vessels by their appearance, will probably be attached to his staff; this does not, however, relieve officers from the necessity of studing the appearance and characteristics of such vessels; in fact, such study should be looked upon as an important part of their duty by all officers who may have to take part in the defense of a coast fortress.

The question of the rate and order of fire to be adopted is decided more by considerations that come under the head of fire control than by those coming under our present heading. The following points should, however, here be noted:

A given number of shots penetrating soft armor will probably do an equal amount of damage whether they strike successively or simultaneously. The damage done to a ship protected by hard armor by a given number of shots will probably be much greater if they strike the armor simultaneously than if they strike in succession. The simultaneous explosion of several heavy shell between decks may be expected to produce much more disastrous effects than would be caused by the same number exploding singly. The "racking" effect on the ship generally will certainly be greater if the projectiles strike at the same instant.

For these reasons guns are in almost all cases fired in salvos by groups, the only exceptions being when ships are lying off at long range and the action is likely to last a long time, and when at the commencement of an action a few trial shots are fired to obtain the necessary corrections. The groups may either fire independently, "Independent Group Fire;" or in succession, "Succession Group Fire." The former gives the greatest volume of fire in a given time, and slowness of loading by one group will not delay the others; as a general rule it would be used when laying by quadrant elevation and training arc, while battery group fire, commencing with the leeward group, would be resorted to when using sights to avoid interruption of the laying of one group by the smoke of another. As regards the rate of fire, this would naturally be slow and deliberate at the longest ranges, increasing in rapidity as the range decreases, and the projectiles have more effect; while against ships forcing a passage past forts, the fire, as they approach the part of the channel where they will be at shortest range, should be as rapid as possible consistent with accuracy.

(*To be continued.*)

CHANGES AND PROGRESS IN MILITARY MATTERS.

Extract from COLONEL H. HILDYARD'S Compilation.*

CAVALRY TACTICS.

OPINIONS respecting smokless powder have, at least in the circles to be regarded, declared themselves still more in the sense that it has not introduced a new era for cavalry. "I imagine that everything continues for us as of old, whether with or without smoke and noise," says Major v. Kleist, in his excellent pamphlet on Officers' patrols, the best, indeed, that has been written on this latter subject. As a logical consequence of the introduction of the new means of propulsion, it must be recognized that the chief characteristics are not the freedom from smoke and noise of the new powder, but rather the increased range, flat trajectory, and precision of the modern arm. As regards the performances of this, especially of the Lebel rifle, experiments at the Châlons School of Musketry have shown that 16 or 17 shots are required to place *hors de com-*

*Colonel von Löbell's Annual Reports upon Changes and Progress in Military Matters During 1891. *Journal of the Royal United Service Institution for November*, 1892.

bat a mounted man halted at 600 m. distance, a number of rounds that would have to be considerably increased if the horse were moving at a gallop.

From this it may be rightly concluded that the chances for the scout are still very favorable, leaving out of consideration the fact that it would be hardly necessary, especially if he were provided with glasses, to ride up so close and without cover. The French, though not those in cavalry circles, are wrong in their pessimist apprehensions. An instruction issued by the Technical Committee for the Infantry runs as follows: "In general the cavalry can ascertain only *sommairement*, and not with precision, the position, strength, and dispositions of the enemy. The insufficiency of the cavalry must, therefore, be supplemented, 'en faisant appel aux autres armes.'"

In the directions for the last great manœuvres there was an instruction in the same sense, to the effect that as soon as the enemy was approached the cavalry was to clear the front and be replaced by infantry groups, which would then take over the scouting duties.

The pamphlet referred to above continues as follows: "To banish cavalry from the battle-field because an improved rifle has been invented, is to view the events of the day as of supernatural size and not in the light of the century, then let us enter merrily into the age of smokeless wars! This time, again, the repast will not be so hot as is now cooking in some pots and perhaps, also, in some people's heads." In this reference, also, Major v. Kleist is completely justified. Every cavalry man will agree with him and none will be kept back by black prophets from doing his duty on the battle-field.

Cavalry will not ride at more or less intact infantry; that it has never done with success, but their opportunity will be where only a weak fire may be expected, as on the flanks, against battalions retiring physically or morally shattered, which have fired all their ammunition. The factors that influence their success, the bearing of the enemy's infantry and the degree of surprise with which the attack is made, lie outside the question of arms.

The well-known Russian General Suchotin expressed as his views that the difficulty at the present time in the employment of cavalry on the battle-field must not lead to their utility being altogether denied, but rather to these difficulties being overcome by means of better instruction. In earlier days the cavalry have profited by some of the conditions of modern war, especially the murderous fire that shakes the enemy's nerves and depresses their spirit. "The entire peace training of cavalry has one object only in view, in the moment of danger to sweep down like a hurricane on the enemy, especially on the most important portion of them, which is the infantry."

The well-known Austrian Colonel v. Walthoffen expresses himself in exactly the same sense. In the *International Review* he has published a very learned and exhaustive paper on the subject. He divides the modern battle into five phases. Already, in the first phase, the introductory, the careless advance of the enemy's advanced guard, or the too late retirement of their outposts, offer favorable opportunities to the cavalry for a sudden

stroke. He does not consider it possible for the cavalry to come forward during the execution of the actual infantry engagement on account of the enormous power of the present rifle. It should, therefore, be withdrawn behind the flanks or centre. In the critical moment, when the attackers proceed to the actual attack, and the defense endeavors to meet them, the cavalry can be employed, though with care, to bring the enemy's attack to a stand and force them to suspend their action. At the decision, that is the assault, or on the defense—the action to repel it, all the forces must be called up, all the arms must coöperate. At the decisive moment one can never be strong enough; just as the last battalion and the last cartridge must be employed, so must also the last cavalry soldier and the last breath of his horse. As regards the pursuit, Scherff's saying is referred to: "Any one who has seen infantry falling back from a real infantry decision, knows what a rich booty they will be, in spite of the breech-loader, to cavalry falling on them at the right time in masses, and riding them down with one heavy wave following shortly after the other."

Colonel v. Walthoffen lays down the following considerations for the success of a cavalry attack:

1st. The most complete surprise possible, the ground and weather will often allow of it; the most favorable moment is when the attention of the enemy is distracted, so that they do not observe the approach, until too late or not at all, and when the enemy's nerve is shaken, the moment of the Napoleonic *événement*.

2d. Against flanks and rear as the most sensitive points; here lies the decision, not only tactical but also strategical; defeat will mean a catastrophe.

3d. The greatest possible energy and development of strength, formation in depth, attack on attack, which will not allow the enemy to regain his senses.

4th. Assembly of all the available forces, unity of leading, determined and energetic execution with a knowledge of the object to be attained. Every individual must be impressed with the irresistibility of his attack. Having regard to the result, even considerable losses must not be shunned. Seydlitz, at Zorndorf, lost in one hour 21 per cent. of his cavalry, 78 officers, and 1267 men out of a total strength of 7000. Tactically his task was as hard as it could hardly be at the present time; for the Russian masses stood 12 ranks deep, and the artillery and infantry fire were quite enormous. Colonel v. Walthoffen, moreover, estimates the number of hits during an attack in the present time very low, indeed too low. He believes that cavalry, up to within 600 m., offer a very bad target owing to the rapidity of their movement and the difficulty experienced by their opponents in arranging their sights. But the last 500 m. would be traversed in less than one minute; more than 1 per cent. of hits should not be expected with normal conditions. The considerations conclude with the words: "Now, as in the time of Seydlitz, and always, if only in sufficient strength, and set in motion in a favorable direction at the proper time, with a definite object, and regardless of consequences, cavalry will certainly break upon the surprised enemy like a destructive tidal wave, sweeping everything away that does not get out of the way of its destroying path."

One principal condition stands out from all these considerations: retention of the cavalry in masses, no dispersion or isolated enterprises of weak bodies, as so often was seen in the 1870–71 campaign. With these mass tactics, if we dare say so, the question of cavalry corps again comes to the front. The Russian great manœuvres of 1890 have brought the question forward again, and the for and against each endeavors to prevail.

The considerations against the cavalry corps are that it only brings to bear the individuality of one leader, and that the supply of such large masses at one spot is impossible. Its extent of front is too small, the covering of the broad front of modern armies demands expansion in different directions and contact with the enemy at the greatest possible number of points. Reports from one point seldom serve to make the situation clear. Further, the commander of a cavalry corps to whom the divisions on the several roads are subordinated is an unnecessary intermediary, through whom the reports have to be sent out of the way and would come too late; also the commander cannot possibly overlook the whole of front, and will frequently, therefore, not be with the main body at the spot where its presence is required. The distance from the centre to the flanks, and *vice versa*, is too great to permit of mutual support. It is not possible to direct on one point, by surprise, 60 or 70 squadrons; the rapidity, mobility, and elasticity, the chief power of cavalry, will be lost. In peace exercises, lastly, this massing of cavalry tends to the neglect of the training in mixed bodies and the working in coöperation of the three arms. It is therefore desirable that the independent divisions should continue to be the unit both for operations and for battle, under the direction of, and immediately subordinated to, the chief commander. The "Jahrbücher für Deutsch Armee und Marine" instance in support of their opposition to cavalry corps the Napoleonic campaigns, especially those of 1805 and 1806, and seek to show that, though so often successful, the reconnoitring was insufficient. In December, 1806, the incomplete intelligence gained by the closely concentrated cavalry corps commanded by Bessières would have made impossible a decision that would at first have been possible at Pultusk.

We might on the other hand, recall the great results effected by Napoleon's cavalry corps. For the strategic reconnoitring, however, it appears preferable to adhere to the division as the unit, and not begin by assembling all the available cavalry divisions in corps. Indeed the numerical strength, or rather weakness, would make this course imperative. Germany, for example, after deducting 20 brigades (40 regiments) for her 20 Army Corps, would only have 52 regiments left from which to form corps. Instead of 3 or 4 of these, the formation of 8 or 9 independent divisions, 2 or 3 for each army, would be more practical. It by no means excludes the employment of cavalry corps. During the operations many situations can be imagined in the different stages of a campaign in which the assembly of several divisions under one command would offer the means of carrying out special definite tasks. And for the battle this must be the rule; for years it has been ordered both by the Austrian and German regulations.

To be in principle against cavalry corps appears to us to be as little right as to form such bodies always and permanently. The military situation

should alone decide their formation. Napoleon followed this principle. He always acted according to circumstances, and he never formed cavalry corps only or formed them permanently. Their strength was varied, often hardly greater than that of German cavalry divisions. The difficulties in moving, leading, and quartering cavalry corps should not be reasons against them: how to overcome these difficulties must be learnt by sufficient practice.

Cavalry Manœuvres.—Some interesting exercises took place in Russia, especially in the Warsaw district and in the Vladikavkas camp. General Gourko, commanding at Warsaw, was present at an exercise carried on by the 1st and 14th brigades formed in a division against a marked enemy, representing at first cavalry and afterwards a rear-guard of all arms, and also at an exercise of the 6th and 13th Cavalry divisions, and the 3d Brigade, 2d Guards Cavalry Division, formed as a cavalry corps against a supposed enemy retreating.

Gourko, on this occasion, dwelt on the importance of practising the marked enemy from time to time. The best officers must lead its squadrons; much more instruction is gained thus than by riding before the subdivision. The more skilful and independent the marked enemy, the more instruction will be derived from the exercise. There will then be no grounds for fearing the most skilful enemy.

At the Valdikavkas camp a force of 7 battalions and 23 squadrons (the cavalry in the middle, 6 battalions to the right and 1 battalion to the left) attacked a large battery of 36 guns, supposed to form the centre of an enemy's position, and having a regiment of infantry on either flank. The moment chosen was after the enemy's artillery had been firing for some hours, and the infantry had come up into the firing line in its support. The cavalry attacked the batteries in front, the 7 battalions were directed on the infantry opposed to them, so as to draw off their fire from the cavalry. The latter started at a distance of 5000 m. from the guns; during the advance both pace and formation were frequently changed, so as to hinder the fire of the guns from taking effect; the attack was executed at all the paces up to the shock; the charge was carried out by means of half-squadrons extended in swarms, followed by the closed bodies. The former surrounded the guns on all sides, the latter passed through the intervals, and fell on the escort and then the infantry. The attack was executed, in spite of the hottest fire, with quietness and energy.

The observations made by the director of the French Cavalry Manœuvres held at Châlons were published in the December number (1891) of the *Revue de Cavalerie*. The following are amongst the more important points adverted to:—In the exercises of one regiment against another, the reports of the advanced guard were generally waited for, which is wrong. The advance should be made, the reports are then received quicker, and the possibility of effecting a surprise is greater. The object of the advanced guard is not to obtain intelligence from a distance in front, but rather to secure the main body from surprise.

When the enemy were encountered it often happened that single squadrons were detached to operate against a small portion of the enemy, and

resulted in a want of unity in the fight; portions of the enemy that separate themselves from the main body are of secondary account; the important point is to overthrow the main body. The flank squadrons did not always carry out their rôle satisfactorily; there were often large intervals between them and the flank of the principal line that had to be protected, so that the enemy could have pushed through and got round the flank in spite of them. The retention of reserves was not always observed, or when it was they entered the fight at the same time as the principal attacking line.

In the exercises of brigade against brigade it was observed that the leaders often clung closely to their troops, and consequently lost view of what was passing. A whole brigade of three regiments engaged in this way three squadrons. It was no excuse that this was due to want of intelligence; no leader ought to engage without having seen with his own eyes. The artillery escort has not always fulfilled its duty; it must reconnoitre the ground about the batteries and thus protect them from surprise. The assembly after the *melée* is best in rear with the reserve not on the actual ground. It took place frequently in column; by regulation it should be in line.

All officers' patrols ought to receive their instructions personally from the divisional commander. The sub-divisions sent forward to reconnoitre should not be altogether extended, as is often done, but they should be kept in close order, and only small patrols consisting of two or three men sent out from them. The strength of advanced guards differs very much; it may be quite right one time to send a whole brigade, and at another two squadrons will suffice. Battle patrols only report verbally, they have not time to furnish written reports. Attacks upon batteries should generally be made on a flank: they were frequently frontal when a flank attack was possible. On one occasion the reserve had been drawn into the fight, and had taken its place on the extreme left flank, when actually required on the right. It must be kept far from the fight, and so placed as to be prepared for all eventualities.

Use of the Carbine by Cavalry.—From time to time, but without gaining in influence, the view is advanced that the employment of cavalry dismounted, and of the fire power of the carbine should be extended. The most advanced ideas on the subject lately published are contained in "Unsere Cavallerie" (Hanover, 1891, Hellwing). "As in a battle, so also in the fight of a cavalry division, every gun, every carbine, and every rider must be made the most of," and, further, "We must place a greater value on the utilization of the fire power of our cavalry divisions, and it is more natural and corresponds better with the perfection of our modern fire-arms to shoot an enemy than to ride him down or run him through." These are the views of the author, and to give effect to them he would form the whole of the cavalry in rank entire. The advantages he claims for this formation are that it allows of more rapid deployment, because in the attack the rear rank is not brought to bear, because it facilitates more extensive distribution from front to rear, and, lastly, because only by means of it is it possible to dismount quickly and maintain a continuous fire action.

Captain Choppin, of the French army, pronounces himself against such theories, in the following words, which are very much to the point: "Every-

thing that can be done mounted must be done mounted." In other armies the same view is taken, and lately an instruction has been issued by the Russian Inspector-General, directing that the practice of fighting is only to be resorted to in those cases in which it would really be used in war, and a warning is given against its excessive employment. Fighting dismounted is and will continue to be a makeshift.

All true cavalrymen must be strongly interested in the question of firing mounted, that has lately been hotly discussed in Russia, which is the more strange from the author being General Suchotin, a generally acknowledged cavalry authority. He speaks of the undoubted guarantees for this kind of fighting from the Napoleonic wars and the American War of Secession, and notices the fact that in the Russo-Turkish War of 1877-78, a lancer regiment fired 40,000 rounds mounted; with what result is not stated. He considers, too, that now the conditions are more favorable for it than they were formerly, when fire could only be used at distances that could be covered in a few strides at the gallop, and was consequently ineffective. The man shooting from horseback has further an advantage over the infantry soldier on account of his greater elevation and consequent extended field of view.

But it is not against infantry but against the enemy's cavalry that he looks for its employment by a weaker force or against an enemy who withdraws from fighting in the open into broken, marshy, or wooded ground. Three or four volleys would be delivered at distances from 1800 to 400 m. and at the last moment the cavalry will be launched with drawn swords on the enemy. Firing at the enemy in front and changing on his flank, and *vice versa*, are specially recommended. Systematic training will lead to the cavalry shooting as well from horseback as the infantry shoot. The author of "Unsere Cavallerie," already referred to, accepts this manner of fighting as already adopted by the Russian cavalry, and thinks it very likely that in a future campaign we shall find Russian squadrons advance at the trot, halt at 500 m., fire a volley, and then straightway charge at the gallop with fixed swords. He is further an enthusiastic adherent for this mode of combat; but if he expects great results from the volleys fired, the Russian cavalry have already proved the contrary. Half a sotnia of Daghestan Cossacks (men accustomed to horses and rifles from their youth), after firing some volleys with blank at the camp of Torni-Chan-Schura, delivered two volleys with ball at targets situated at 800 m. and 600 m. distance. The result was four hits to 60 rounds, and none to 52 rounds respectively.

Corps or Divisional Cavalry.—The comparatively weak strength of the cavalry and the constant and proper endeavor to mass it have contributed greatly to the value of corps or divisional cavalry being underrated. The reports of the Russian and French manœuvres contain frequent complaints of this. It has been imagined that, in the present age of the employment of enormous masses in war, divisions and corps would play a secondary rôle and that single Army Corps would no longer march against an enemy, but only armies of five or six corps; consequently, the cavalry should be taken from the corps commander and placed together under the orders of the general in chief command. In the endeavor to form the greatest number of cavalry divisions, it is often deemed sufficient to provide the infantry with

a few orderlies, as far as possible mounted on horses called up on mobilization.

Russia, for example, has formed almost her whole cavalry into independent cavalry divisions (twenty). Only twenty-four sotnias are available as corps cavalry, which, in the course of mobilization, would be strengthened by the Cossacks of the 1st and 2d levies. But the latter could hardly be depended on at the commencement of operations. But such views are a misappreciation of the actual conditions. Undoubtedly both species, the cavalry divisions and the corps cavalry, have their full justification. The operations and strategic measures to be adopted will depend on the reports of the former, the tactical measures on those of the latter. The war of 1870-71 offers a number of examples of the divisional cavalry making important reports which had not been sent in by the cavalry divisions. A number of corps belonging to an army never march close together, but on different roads, often separated some distance from one another, in an enemy's country, perhaps in a country the inhabitants of which have risen. The connection of these columns with one another can only be maintained intact by means of cavalry. The cavalry divisions are often more than a day's march in advance and are not in a position to undertake the indispensable duties of immediate security. The German "Felddienst-Ordnung" says: "Cavalry divisions or portions of them in front of the army are, having regard to their special tasks, not generally in a position to cover immediately the portions of the army that are following. These must, therefore, even if they have cavalry divisions in front of them, always tell off an advanced guard. It is the duty of this latter to obtain and keep up communication with the advanced cavalry divisions, by means of its cavalry."

And, lastly, without cavalry the corps ceases to be a strategic unit; in the absence of direct reports the commander cannot possibly have the time to make his decisions and dispositions. Napoleon always had his cavalry divided into two parts, independent divisions or corps, and the regiments attached to the individual infantry corps; the strength of the latter was not fixed and unchangeable, but it depended on the strength of the corps—which differed considerably—the service to be performed by it, and its greater or less independence. In the 1805 campaign, for instance, there were 112 squadrons assembled in cavalry divisions and 92 squadrons distributed between the 7 separate corps (7 to 16 squadrons per corps). In 1806 the proportion was 114 and 61; in 1809 it was 97 and 37 (7 to 18 per corps). The corps on the flanks were made particularly strong in cavalry. The campaign of 1806 offers, also, a very clear example of the necessity for having corps cavalry. The cavalry was withdrawn from Bernadotte's corps and the regiments allotted to the reserve cavalry. Bernadotte, who had in his front Bessières with 2 cavalry divisions and 3 light cavalry regiments, feeling his helplessness, asked that his regiments might be given back to him at once, "for it is of the greatest importance that every corps should have cavalry, even when there is cavalry in its front." He was very nearly being surprised.

The number of squadrons to be employed with each corps as divisional cavalry should not be greater than is required to perform efficiently the

duties they will be called on to do. Both in Germany and in France it has been fixed at a brigade of eight squadrons. In view of a pitched battle it will generally be practicable to unite the cavalry of the several corps temporarily.

The necessity for an increase to be made to the cavalry is gradually gaining ground. The important new formations of the last few years have almost all been to the benefit of the infantry and artillery. The old proportion between infantry and cavalry has, even in peace, gone back from 4 : 1 to 10 : 1, and in war, on account of the enormous reserve formations of infantry, it will sink as low as 20 to 1. And at the same time the demands on the cavalry have constantly risen. The sphere of their activitity, that is their own front to be covered and the enemy's front to be explored, has materially increased in extent. The magazine rifle would soon reduce the existing insufficient number still more, and it will then be hardly possible to obtain the necessary men to complete their strength, for the cavalry is the least suited arm for reserve formations. In consideration of all these points, the several States are now commencing slowly to increase the numbers of their cavalries. Russia has raised a new 15th Cavalry Division, provisionally of three regiments only (47th and 48th Dragoons and 3d Ural Cossacks). The fourth dragoon regiment which is wanting will, no doubt, be created before long, and to all appearance this division is only the beginning of further new formations. Russia has now 20 cavalry divisions (2 Guards, 15 Line, 1 combined Cossacks, 1 Caucasus, 1 Don Cossacks of 4 regiments, each of 6 squadrons) and 24 sotnias of corps cavalry, to which in war the 1st and 2d Cossack levies would be added. Austria-Hungary has raised a new 15th Dragoon Regiment. The "Reichswehr" says this by no means suffices, for in a future campaign there would be 782 squadrons opposed to 341 at the disposal of Austria. France under the authority of the laws of 1887 and 1890 has raised the 30th Dragoons, 13th Cuirassiers and 13th Hussars, so that she now has 87 regiments, of which 10 are in Algiers and Tunis, and must consequently not be reckoned in the first line.

Night Operations.—These are beginning gradually to become naturalized, but, as yet, not to an extent proportionate to the importance of the subject. They have for years past formed a part of the exercises of the Russian army, and have now been introduced into France and Italy. During the last French great manœuvres an exercise of this nature was held, and frequent ones at the Italian camp of Caserta.

Magazine Carbine.—This arm has been introduced into the cavalry in Germany, France, Austria, and Belgium.

Exercises in Swimming.—Draft swimming instructions have been issued to the German cavalry. The saying of General Gourko, "Canals and rivers are no longer obstacles to the cavalry," must not be so unconditionally accepted. In the practical trials many difficulties have arisen which at first were not encountered; swimming over rivers in this way without preparations is not generally feasible. The draft of the German swimming regulations also dwells on this. "If the horses are not in a condition to carry their riders for a considerable distance," it then follows from this that "a stream of some depth and breadth cannot be crossed by a formed body of cavalry without the help of boats."

The *Revue de Cavalerie* arrives at the same conclusion in its paper contained in the September number (1891), "Passage des Rivières." It treats of the three methods—the rider in the saddle (Skobeleff); swimming by the side of the unsaddled horse, saddle, arms, etc., on rafts or boats; and swimming by detachments behind a boat, the men, saddles, and arms in the boat. The latter method is held to be the safest and most desirable. "But in any case an endeavor should be made to have in every squadron some patrols which, lightly armed and provided with light equipment, can swim broad streams without assistance and be able to ride on without delay on the other side." Certainly that must be attempted and, under any circumstances, steps taken to insure that unimportant watercourses, which often have only a few feet of the depth for swimming, shall cease to be obstacles, and to cause a detour to be made, as is now often the case. Repeated exercises will remove timidity both from horse and man.

THE NECESSITY FOR A TWO YEARS' TERM OF SERVICE IN GERMANY.

By LIEUT.-GENERAL VON BOGUSLAWSKI.

(*Précis of Translation from the German.*)

THE law making military service compulsory in Prussia passed the 3d of September, 1814. That law required three years under the colors.

The full requirements were as follows:

In the cavalry 3 years;
In the reserve 2 years;
In the first division of the Landwehr 7 years;
In the second division of the Landwehr 7 years.
Total.....19 years.

The Landsturm included all males capable of bearing arms between the ages of 17 and 50 years. At that time the number of Line cadres did not correspond with the number of recruits to be annually incorporated. The number of organizations being too few caused the introduction of the so-called Landwehr recruits, *i. e.*, a number of those who were called up for service, and for whom places could not be found in the line organizations, were assigned to the Landwehr cadres and were instructed for a period of 12 weeks.

The mobilization of 1830 discovered the weakness of a system which did not make provisions for a stronger force of instructed reserves. This was made all the more sensible from the fact that in the line there were still many re-enlisted men, "Kapitulanten," in the ranks in whose places no recruits could be introduced. How change this? With good judgment the government finally adopted two years' service in the infantry and field artillery. The two years' service was introduced in 1833 after the majority of the general officers had approved of the experiment. It was made permanent in 1837.

The first tests of the Prussian troops after this change came in the revolution of 1848-49 and in the mobilization of 1850.

A full knowledge of, and a careful examination into the occurrences of that time lead me to the conviction that the evils heretofore laid at the door of the "two years' service" cannot be proved to belong there.

In 1852 the three years' service with the colors was again established; at first with semi-annual leave for recruits, but this disappeared in 1854. Just what brought about the change we do not know. But it seems to us quite probable that the authorities were of the opinion (directly opposed to that which we have announced above) that the unfavorable appearance and performances of the Landwehr were due, at least in part, to the short term of service. And further, that in consideration of the revolutionary events that had been experienced, a longer term of service would be advantageous in fostering the military *esprit* and in strengthening discipline. A general writing at the time states that "the demoralizing tendency of the times makes it all the more necessary that the 'Stahlbud der Treue' should be all the stronger." Then the opinion gradually grew up that the greater number of old soldiers in the armies of Russia, France and Austria had a tendency to give them an advantage over our troops of short service. Finally it became quite evident that a better course of instruction in firing was necessary with the rifled small arms then being generally introduced, and that more time must be devoted to instruction in open order fighting and to field service in order to make the infantry thoroughly efficient. In order to accomplish this it was believed that a longer term of service was necessary, especially as the authorities were not then inclined to discard a mass of useless exercises then in vogue, and which we have since cast aside.

In order that our point of view may be clearly understood we will here distinctly state that we naturally are not opposed to the three years' term of service *per se*, *i. e.*, we hold that a German soldier who has had three years' instruction is better fitted for his work than a soldier of like capabilities who has had but two years' instruction. But as war can never be considered in the absolute but only in connection with and in its relation to the political situation, so also with war provisions. These cannot be determined upon the simple question of what is most desirable for military purposes, but must depend upon the temper of the nation, the financial condition of the state, the national frontiers, the character of the inhabitants, etc.

In the year 1857 the "Dispositionsurlauber"* first made his appearance. On the 8th of January, 1857, the authorities decided that a number of the oldest soldiers of the infantry, artillery and pioneers should be sent to their homes in order to avoid the disadvantageous necessity of assigning recruits to these various organizations before the time came round for the reporting of the next annual levy. This plan had already been in operation in the Guards and the cavalry. At the same time it was determined that a like number of recruits should take the places of the furloughed men, but these furloughed men could be recalled after February 1st following to fill up the vacancies that had occurred in the interim. It was evident that the authorities used this provision as a means of rewarding and distin-

*Furloughed subject to call.

guishing the best soldiers of their commands, and it cannot be denied that the measure was then considered as an incentive to good work.

Let us now return to our inquiries. The reasons for the arrangements of 1857 are to be looked for in the desire to deliver the troops from the annoyance of introducing recruits more than once per annum, and also to secure the instruction of a few more men; while the objects in view in 1864 were to increase the number of disciplined and instructed reserves as well as to lighten the burdens of military service. In the meantime King William I. had determined upon reorganizing the army. That reorganization touched upon the following points:

1st. The number of recruits to incorporate is too great, hence increase the number of organizations, thus incorporating a greater number of recruits whereby the reserves are increased.

2d. The Landwehr of the first ban is too loosely organized for future field service and some of the men are too old; hence extend the term of service in the reserves. The line with the increased reserve is to become the field army, the Landwehr to be employed, as a rule, as troops of occupation.

3d. As equivalent for the increased burden the total term of service is to be reduced from 19 to 12 years.

After the reintroduction of the three years' service only eight years before to again change back to two years would indicate a wavering policy, and notwithstanding the opinions of the majority such a course would have a detrimental influence. Besides there was no military reason for such a change. Prussia was the only state requiring universal service wherein substitutes were not permitted. Hence, in the strength of our reserves, and consequently in our war formations, we were far ahead of other states in proportion to the number of our population. The increased number of recruits annually incorporated since 1860 which, according to the plan of the reorganization should belong to the reserves, enabled us to put a highly disciplined and instructed field army of three hundred thousand men in the first line against an enemy. The events of 1864 did not secure the reestablishment of friendly relations between the Government and other rulers. This brought about the campaign of 1866.

The creation of the North German Bund and the incorporation of several German states in Prussia, brought under the King of Prussia as commander of the standing army, twelve corps d'armée in time of peace. All great states began reforms and preparations which increased the war strength beyond what seemed to us necessary in 1866. Hence it was ordered that enough men should be sent on leave at the time of the general furloughing to enable each battalion to receive from 180 to 190 recruits.

The great war with France came. It was natural that this should raise the reputation of the Prussian army system, which had been adopted by all Germany, to the highest pitch.

Under the influence of this fair current the desire for the two years' term of service was silent for a long time. The three years' service under the colors and the total service of twelve years was adhered to. The law also touched the Landsturm, and provided that hereafter the Landwehr should

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take the place of the second ban of the Landsturm. In the meantime the military situation in Europe changed very greatly. France indicated, by her recruiting law of 1872, and by the laws of 1874 and 1875, that she contemplated creating an army which would be superior in numbers to that which any one, or even several European states, had ever set on foot.

The term of service for one part of the annual contingent was to be five years while for another class it was to be one year.

It was announced in 1874 that France in future could place a much stronger field army on foot than Germany could with her twelve years' service. From this time on the query that Germany has been trying to solve is, how to meet this future superiority of France?

In 1880 the Germans concluded they could no longer sit inactive witnesses of the steady and rapid growth of the French army. The introduction of universal military service in Russia, thus increasing her forces, assisted in the matter, as the relations between Germany and Russia had changed somewhat since the Congress of Berlin.

Our infantry and artillery cadres were increased. The former to 503 battalions, the field artillery to 340 battalions and the foot artillery to 31 battalions; provisions were also made for the instruction of the first class of the recruit reserve by calling it out for ten weeks the first year, four the second and two weeks each for the third and fourth years.

Thus the instruction of militia suddenly appeared again in the German army.

On a peace footing the army now number 427,274 men, and in each year 17,000 recruit reserves were required to be drilled.

It was then proposed to replan the makeshift of the recruit reserve by the two years' term of service and they argued that the thus increased number of reserves would provide for all eventualities, and this course found friends outside the ranks of the opposition.

The conditions have changed since that time in so far as the discussion of the military possibility of such an arrangement is concerned. In 1860 they considered that the reduction from three to two years' service would carry with it a reduction in the strength of the cadres. They proposed simply to incorporate in the infantry regiments the recruits of two years instead of those of three. Now it is proposed to increase the number of recruits called up annually by about one-half and in this way maintain the cadres at their present strength at least. The constantly increasing strength of the French cadres, the encroachments of the Russian troops on the western frontier of Germany, led to the opinion that our fighting force was not sufficient to hold its own, notwithstanding the conclusion of an alliance with Austria and Italy. General von Verdy, as minister of war, communicated to the Reichstag at its session on the 24th of June, 1890, that in 1886 the opinion of infantry officers, regimental commanders and those above that grade had been called for as to whether the two years' term of service was permissible or only possible. Only one regimental commander declared the thing practicable. This single regimental commander was the writer.

In France General Boulanger had assumed charge of the war portfolio and had submitted to the Chamber the project of a military law which if

enacted would have greatly increased the strength of the French army. At the same time France, through Boulanger's influence, pushed the work of the Patriots' League, and by means of a few accidental conflicts brought matters nearer to war than they had been since 1871.

In Germany they again determined to increase the number of cadres and consequently to increase the number of recruits.

The new election, under a patriotic movement of the German people, brought a representation which was composed of all the moderate elements and the bill was passed. This gave us 534 battalions of infantry, 465 squadrons of cavalry, 369 batteries of artillery, 31 battalions of foot artillery, 19 battalions of pioneers and 18 train batteries. The peace strength was thus raised to 468,409 men.

Soon thereafter the government submitted an indispensable amendment to this law. This was the restoration of the nineteen years' liability to service, and the extension of term of retention of the men who had served with the colors from their 39th year to the 45th year of age.

But on the 15th of July, 1889, the French Chamber accepted the military project submitted by Boulanger, to which reference has been previously made. France outdid us again to a very sensible extent. The inexorableness of the law now introduced in France requiring universal service has been fully described.

At the same time the Russians strengthened their army in a similar manner.

The two years' term of service was again decided against and the project of a law was submitted to the Reichstag on the 6th of May, 1890, which proposed another increase in the number of our organizations, especially of the batteries, and an addition to the number of recruits annually incorporated of 6000 men. The additional proposal was made to increase the number of men sent on leave by 6000.

In general the feeling, owing to the soundness of the government's position, was not unfavorable till the Minister of War declared in the session of May 21st that the project submitted could only be the first step, that the government adhered to the Scharnhorst doctrine; that every man physically qualified for military service should be instructed.

The minister was frank and loyal in this announcement. The effect, however, was unfavorable. This, in my opinion, is not to be wondered at. The country was confronted with a project that contemplated a constant gradual increase of the army. It is quite probable that the majority of men will frequently shrink from the sudden appearance of high demands, and indefiniteness often has a startling effect.

Scharnhorst was a great man, but it was impossible for him to grasp the necessities and conditions of the country in regard to its military force in the future, and to properly estimate and measure it at a period when the great, burning thought was to again establish the crushed Fatherland. We can take the dominant thought of such a man in a general way as a guiding star, but his special proposals will never show just what is right and necessary for us to do now.

The Liberal party, according to the announcement of their leaders, would

insist upon the introduction of the two years' term of service, or upon the introduction of a militia alongside of the line of the army.

The government, through the Minister of War and General Vogel von Falkenstein refused the admission of militia. The final result was the acceptance of the law as proposed, but also several resolutions, one of which announced that "the Reichstag expected that in future the government would avoid all expensive military plans."

The majority also believed that they had reached the extreme limit of the national strength.

It was clearly demonstrated by the representatives of the government that even with the conditions created by this last act we must still always be greatly inferior to France.

A brief review of the period included between 1890 and 1891 will lead us to this conclusion :

Defeats arouse a great nation and enable it to put forth incredible exertions.

Victories often produce entirely opposite effects in different nations. France made immense exertions twice in twenty years, the passage of the laws of 1872 and 1889. These enabled France to do anything within the bounds of possibility. Three fortunate wars, coming as they did in close succession, had created in Germany such great confidence in her military strength that a large percentage of her people gave way to the natural inclination to economize, and wished to carry this even into the affairs of the army, and it has required the constant efforts of our far-seeing men to counteract this feeling and to create a better sentiment.

After the passage of the act of 1889 in France and that of 1890 in Germany, the two armies stood as follows :

FRANCE.	GERMAN.
Standing Army.	
561 Battalions of Infantry and Jagers, also	538 Battalions of Infantry and Jagers.
144 depot battalions (weak fourth battalions).	
83 regiments of Cavalry. (4 to be organized.)	95 regiments of Cavalry.
480 Batteries.	434 Batteries.
100 foot batteries.	31 battalions foot Artillery.
19 battalions Engineers.	20 battalions of Pioneers.
65 Train Companies.	21 battalions of Train.

France has a superiority of 23 battalions of infantry and 46 batteries.

Germany has a superiority of 12 regiments of cavalry (which will soon be reduced to 8) and 1 battalion of pioneers.

The comparison of the foot artillery and of the Trains is not attempted because of the difference in organization.

The strength of the standing army amounts in 1891 :

In France to .....520,548.
In Germany to.....498,983.

The war strength amounts in 1891:

In France to.....3,240,000.

In Germany to.....2,900,000.

The war strength will amount in 1914-15:

In France to..... 4,125,000. (This includes 80,000, Gendarmes, Foresters, etc., who are fully armed, etc.)

In Germany to.....3,458,000 men.

The war strength of France is calculated by taking the annual number called up (220,000) for twenty-five years and deducting 25 per cent. for loss; that of Germany by taking the annual installment of 170,000 for twenty-four years and deducting 25 per cent. for loss. There should be added to this some 9000 one year volunteers and 18,000 recruit-reserves. Our minimum war strength amounts in 1891 to 420,000. It will amount to 747,000 in 1914-15.

In the calculation only instructed soldiers and incorporated recruit-reserves are counted.

Germany has a population of forty-nine millions while France has but thirty-eight millions.

It may also be mentioned that the average charge per capita in Germany in the year 1889 was nine marks ten pfennig, in France it amounts to ten marks sixty-six pfennig, and all the unserviceable men in France who are not accepted in the army have to pay a war tax.

II. THE PRESENT SITUATION.

We have to-day in the infantry, artillery and pioneers three years' service, two years' service (really twenty-two months), one year volunteers, recruit reserves, with a total service of twenty weeks in the infantry, foot artillery and pioneers and in addition the drills of the teachers in the public schools. Besides this a portion of the Train troops serve for three years, and a part for but six months. We thus see that there are a good many different terms of service in the German army.

I hold that a percentage of old soldiers is very desirable in all the armies of the present time. The recruits should look up with respect not only to the officers, but also to the old soldiers. This strengthens and fosters the military spirit and lightens the officer's work. We had such old soldiers amongst our three years' men until 1868. The soldiers who had made the campaign of 1870 exercised a good influence on the recruits. In the continued peace this source of influence disappeared, and the three years' men left with the colors can no longer have this effect.

It has often been stated that without the third class the company commander could not provide himself with non-commissioned officers.

There are phrases of speech, called forth under opportune circumstances, which are made applicable now and again under other conditions, and through being frequently repeated become generalized and pass into maxims and are accepted by the great majority without giving the matter careful consideration.

Does the company commander really need from two to three years in order to judge whether this or that fusilier has the stuff in him to make a

good non-commissioned officer? Mistakes will always happen and a number of candidates will always fail to come up to expectations. Such a thing cannot be provided against. Nevertheless we can maintain with perfect confidence that the company commander can select his non-commissioned officers from his men of two years' service as he can from those of three.

It has been stated that the object in sending a large number of men on furlough was to secure the incorporation of a larger number of recruits. That in furloughing men good behavior, instruction, conditions at home and length of service were to be taken into consideration, and that it was very difficult to combine all these conditions without doing injustice at times.

These same conditions are repeated in the Army Regulations of 1888.

Without permitting myself to go into details I can state that the experiences in the different organizations have been quite various since the introduction of the system of sending men on leave. In one all the responsibility of this important work was thrown on the company commanders, in some it was controlled and decided by the battalion commander, while in a third the regimental commander provided for a less effective control of the matter. One company commander based his decision mainly on the conduct and instruction of the men, another allowed the home claims to take precedence, while a third released his men in order to secure good lance corporals.

No less an official than Chancellor von Caprivi invited the attention of the Reichstag to the defects in this system on the 24th of June, 1890. After speaking of the increased expense that would be occasioned by the introduction of the two years' term of service he stated:—"Doubtless there are soldiers amongst our foot troops for whom the two years' service (24 months) with the colors might be preferable. We now have terms of service varying in length, all burdened with the deficiencies inherent to the leave of absence system, and freighted with the reserve recruits. If the two years' term of service were once determined upon, and these annoyances set aside, and the compensation granted, of which mention has been made, I believe that many soldiers would approve of it." This is also my opinion and I am an advocate of that policy.

The recruit-reserves are formed from the following:

First. From the men who have drawn the highest numbers or the surplus which had not been incorporated on or before the 1st of February following the close of the third year of their liability to service.

Second. Those who are excused from serving with the colors because of conditions at home.

Third. Those who measure under 1.57 m., or who have slight physical blemishes.

Those who are excused from service on account of conditions at home do not drill as a rule. Those who are drilled are selected from the most vigorous and best people of the other categories. The most of those who are drilled are qualified to be incorporated into regiments. The standard in measurement could be reduced to 1.54 m. with great propriety. Trifling physical abnormalities are frequently no obstacles to good service.

The drilled recruit-reserves form a makeshift. An army consisting entirely of recruit-reserves would be inapplicable in a great campaign.

It does not admit of question that, in mobilizing, it is very much better to have a large number of partially instructed instead of totally uninstructed recruit-reserves in the Ersatz battalions. It has been shown, by the figure heretofore given, that the recruit-reserves do not suffice to bring our numerical strength up to that of the French. The year 1870 has shown us with what suddenness the first shocks may fall, and there is no reason for thinking that it will be otherwise in the next war.

All that is possible has been done for them in the exercises of the last decade. Their instruction is a brilliant exemplification of the insight and ability of our instructors, but from a military point of view it is not imagined that they have made real soldiers out of them. There may be a small number of experienced soldiers in a company who will perhaps do their best.

But at the cost of how much exertion is this number obtained? The infantry has first to instruct its recruits, and at the same time to push the instruction of the older men further along. It is necessary, as a rule, to call out the reserves once a year (in 1890-91 several times). Great numbers are called out to be instructed with the Landwehr, the battalions have to be uniformed and great numbers of non-commissioned officers have to be detailed to instruct them. For eleven years the recruit-reserves have been added to this. They receive a hasty course of instruction. The ill effect of this on the non-commissioned officers has already been noticed. There are three annual encampments—the first for ten weeks, the second for six weeks and the third (regimental) for four weeks.

Notwithstanding the simplification of the drill the requirements are burdensome, partly owing to the constantly increasing requirements in shooting and field exercises, and this has a damaging effect in securing instructors which again makes itself felt in the diminished number and personal worth of the non-commissioned officers.

The recruit-reserves have brought with them the greatest part of this additional work, and I am fully convinced that all company commanders would see this half-way military element disappear with great pleasure.

The recruit-reserves and the furloughed men all disappear upon the introduction of the two years' term of service. The unity of the army would be again secured, distrust, reclamation petitions, excessive demands would be reduced to a minimum.

We have now shown the defectiveness of the present system and also that the two years' term of service could not fail to have a beneficial influence on the mind of the soldier and upon the people. The sense of justice and the submission to law could not fail to have a good influence.

We would say, however, in passing, that the introduction of the two years' term of service would afford great satisfaction to our people. We are not inclined to yield to every popular demand. When, however, it is possible to give the army an organization that leads to contentment in the country it is wise to do so.

Is it not possible to convert the recruit into a serviceable soldier in two years?

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Upon the condition of an increase in the number of our cadres I do not hesitate to answer this question with a distinct and positive yes! We shall go into details later along.

General Vogel von Falkenstein as a member of the committee asked the question: "Do we consider ourselves so much more capable than our neighbors as to believe that the average recruit could be sufficiently instructed in two years while the Frenchman required three and the Russians five years to accomplish the same thing?" We might answer this by saying that in 1870 we came off very well with our men of three years' service when opposed to the men of longer terms of service in the Imperial army of France. I am fully conscious of how much fortune favored us in 1870, but in many cases where the forces were of equal strength, or where the Germans were outnumbered, our people not only showed that they were individually the Frenchman's equal, but our organizations also showed that they were superior to the French in endurance.

The French have only just entered upon the three years' term of service and yet they find themselves under the necessity of sending a large number of men on leave in order to keep the cadres down to a reasonable strength. The difference between their term of service and a full term of two years as proposed with us would not be very great. It is true that there has been a favorable change in the French army since 1871 by their devoting more attention and care to the instruction of their people. We will not deny that the French are greatly gifted, nevertheless have we not had the start of them in national education through an experience of almost eighty years of general military service, at least in old Prussia. We must not undervalue the fact that the fathers and grandfathers of our recruits have served with honor, and gone through campaigns in the same regiments. We have the traditions of the general military service. How the man who has served still talks and thinks of that position and period of his life is a matter of daily experience when old soldiers meet, notwithstanding the undermining work of the democratic socialists.

We must oppose the view that our men are less apt than those of other nations. This view seems to be advanced by Colonel von Viebahn on page 20 of his often mentioned article. It is there stated:

"Perhaps other nations can instruct soldiers for modern warfare in shorter time and with less work. We cannot. The German soldier, judging from general and long experience, and which we see renewed daily, cannot be improvised. He can only do what he has been taught. As we teach so shall we fight."

This would place the German soldier behind his fellow of other nations in capability and aptness if the sentence did not begin with "Perhaps."

This view is entirely without foundation as practical experience has shown.

The lessons of history and those of our time, and I may be allowed to include my personal experiences, are all opposed to this.

In the sixteenth century the general preëminence of the German soldier, of the footman and the cavalryman, was fully established. The war feeling, the dexterity of the Germans, and of the Swiss of German descent, in

the use of arms far exceeded that of any other nation with, perhaps, the exception of Spain.

In the seventeenth century the military spirit and qualities of the French were strengthened by the tense centralization of her kingdom, to sink back again in the eighteenth. In the eighteenth century the system of fighting was such that the individual qualities of the soldier were seldom called into play. The infantry were drilled to manœuvre and fire in masses. The Prussians distinguished themselves in this and were copied by others. The French Revolution prepared the way for open order fighting, and because the French excelled the Germans in this novelty the opinion prevailed that the Frenchman was a more skillful and better skirmisher, and from this the conclusion was drawn that he possessed a higher military *esprit*. This we deny, each nation having its peculiarities, it is necessary to take all its capabilities into consideration in order not to form a false conclusion. The French nation is certainly more united, more homogeneous in its material than the German. There is a greater difference between a Holsteiner and a Saxon—a Pomeranian and a Rhinelander or Badener than there is between a north and south Frenchman. Taking all in all the French are smaller, more active and perhaps somewhat quicker than the Germans, while the latter is more enduring, cooler and a better skirmisher, and the last named qualification is now a great factor. It does not seem to me possible that the Frenchman has a quicker and better aptitude for military things than the German. After the armistice of 1813 the Prussian Landwehr did as much if not more than the French volunteers of 1792 and the conscripts of 1793.

We must maintain that the statement made in Colonel von Viebahn's article is not well founded. In the actions of 1870–71 it did not appear at any time that the French were superior to our men in skirmishing.

Before Paris our fortifications were frequently faulty and disconnected at first. This was the natural result of faulty leading and to the further fact that victorious troops do not take to the spade with alacrity, and that we had not fostered the art of the pioneers sufficiently. I then saw, in dangerous places of the action, quick devices employed by our people in the arrangement and employment of localities that were exceedingly dexterous.

If we only follow a course of instruction from the beginning which is suited to the natural capabilities and understanding of the man, and further develop him, we would see how soon he would become accustomed to taking advantage of accidents of the ground in action. Our new regulations point in this direction, but the work is not yet practically carried out as it should be and it is not properly inspected.

When we consider further that a mass of drill exercises and useless manual have been discarded we can say with a good deal of confidence: Yes! A well employed two years' term will fully instruct our men.

General Vogel von Falkenstein thought that on introducing the two years' service it would be necessary to authorize a greater expenditure of ammunition during the year in order to make up for the year taken off. Do we do this with the men we now send on leave? Besides I am of the opinion that there is a limit to the usefulness of instruction in shooting for

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the methods of fighting of the present day. It is well understood that a definite target is only found in exceptional conditions of an action, usually in the defensive. In actual work the chief thing is correct pointing, *i. e.*, quicker and more exact aiming in shooting from the shoulder, the gun in the correct line, and the position in firing lying down. I am also an advocate of a good, but not too long, course, of instruction in the gallery. It is certain that the execution of a good and badly instructed organization would not have equal weight when the real work began. But I am of the opinion that by a systematic instruction in group shooting at targets representing an enemy in action we could accomplish this work if the course was taken up a little sooner. I also think that the man can be carried forward far enough in his firing during the second year to make him a capable skirmisher, especially if he is required to be present at the manœuvres of the third year.

We will go still farther and propose the two years' term of service for the artillery and the pioneers.

It is very remarkable that, notwithstanding the fact that the two years' term of service applied also to the field artillery from 1833 to 1852, no one has dared to suggest the possibility of reducing the artillery to two years' service with the exception of one officer in an article written over the *nom de plume* "Muller." This is based upon the fact that the majority of people look upon the artillery even at this time as the "learned arm," consider it a technical specialty; and from the fact that the artillery officer may have learned a few more mathematical and technical things than the infantry officer, it is concluded that his instruction of the men is more difficult. This is one of those legends which are so often granted general circulation and credence. The men of our field batteries consist of two classes, the cannoneers and the drivers. These two classes are held entirely distinct throughout their entire term of service. Of all soldiers in the army the cannoneer has, beyond all doubt, the simplest work. After he has drilled in the exercises that are prescribed for the infantry recruit, before he has a rifle put in his hands, he is exercised at the guns. No one will deny that the work of the different numbers of the gun detachment is exceedingly simple, and that the gunner is the only one that has a duty that is in any way difficult. The infantry rifle is as complicated a machine as the field gun. It requires a much greater readiness to direct and discharge an unsteady rifle at the enemy than simply to lay a gun. Every infantry soldier must understand taking advantage of the accidents of the ground, the ordinary cannoneers have nothing to do but to obey the orders of their officers who put the battery into position. The wavering infantry struggle is constantly changing its character and it frequently becomes necessary for the individual man to act upon his own judgment and responsibility. At one moment he must act on the defensive and the next on the offensive. The artillerist is tied to his guns and his activity is much less dependent on the varying phases of the struggle. We do not wish to undervalue the artillery, for the persistence at the guns under fire and in the danger zone is a service of high order, but under all circumstances the fighting work of the cannoneers is simple and less independent than that of the infantryman. It may also be noted

that the cannoneer does not have to learn either vidette or patrol duty, and that being mounted on the march his exertions are not nearly so great as those of the infantryman, as Colonel von Viebahn has already stated in his paper.

The instruction of the drivers can be accomplished in two years. This will find less opposition as the earlier custom was to interchange the drivers and cannoneers.

We have also seen that the service of the piece was learned unusually quick in improvised batteries. Rustow calls attention to the performances of the raw levies in the French batteries created in the North Army in 1870-71. They were deficient in mobility for competent drivers, and trained horses cannot be created by magic, but the serving of the piece was good. The service of the horse batteries was a harder task. The men had to learn to ride as well as to serve the pieces. But they are only required to be able to follow the guns at all gaits. Exercising the horses in making short turns, the use of their weapons while mounted, etc., are made matters of secondary consideration.

With the foot artillery it is different inasmuch as the service of the different pieces is demanded. Besides the men have to carry portative arms and are also required to go through a course of rifle practice. The practical work with the rifle is limited to the simplest necessities—defense against attack while in column of march—or when in camp.

The foot artillery has also to construct batteries which requires practical instruction. What we have previously said concerning the simplicity of the work at the guns in action applies here also.

But it must be confessed that the introduction of the two years' term of service in the foot and horse artillery seems to me of doubtful propriety but still one of the possibilities.

For the cavalry, in which arm no men have been dismissed on leave since 1874, the introduction of the two years' term of service is not possible. The cavalryman must not only be a good rider and as ready to take a ditch as the mounted artillerist, but he must also be prepared to fight mounted, and this now, in the German army, with the lance which is a very troublesome weapon to handle. He must have his horse constantly well in hand. The horse must be thoroughly manageable at all times, must yield ready obedience to his rider even in the *melée*, and should be taught to move up against a line of fire. The cavalryman must reconnoitre the enemy through bush and timber, and over mountain and valley. If he is dismounted to fight on foot he must be as dexterous in the use of his carbine and in making the best use of the accidents of the ground as a skirmisher. The foregoing suggestions make it clear that it is not possible to accomplish the work in two years, and further argument is unnecessary.

It cannot be denied that the pioneers have a very varied service. They receive, however, in a great measure, people who are specially qualified by their previous calling, for the work assigned to them. Consider, however, that their drill under arms is simplified, that they are not intended for the fighting line and therefore do not require the instruction of the infantry but rather that of the foot artillery, and still further let it be remembered

that the furlough system with all its faults exists with them now, and we are thus able to approve of the two years' term of service for this arm.

Now and again, we hear the opinion expressed that the introduction of the two years' service would be a step on the road towards urging the introduction of the militia. This is one of those predictions which is not founded on anything, and which can only be answered by asking who will permit himself to be urged. A year is required to instruct the recruit in the things he should know. But what has been learned must be gone over again in order to improve it. This is the simple rule of the pedagogue. So we find that the military *esprit*, *i. e.*, the cohesion of the troops, the consciousness of being an old soldier, can only be found in the second year. It is only then that the things he has learned in the first year have become natural to him.

A French officer states that the distinctive difference between the calling of a soldier and that of others is that the soldier's work has to be performed with death staring him in the face. Military honor, professional pride and the force of habit aid the soldier even in moments which try the nerves and weaken the power to reason and in moments when the danger of death is great still enable him to perform his duty in executing, by a sort of second nature, the things he has done so often during times of peace. A two years' term of service is at least necessary to attain this object.

If it be thought that Germany with a full three years' term of service can produce such fine soldiers, that by reason of their superiority, she can maintain the upper hand, and so can consciously remain in the minority, then all is well. Let us have the full three years' term of service. But if this be not possible, then let us adopt the two years' term of service, for by this means we can reach our people and can equal any nation in time in numerical strength, with the single exception of France. The present situation is not healthy.

III. PLAN AND COMPARISON.

Of the men subject to service in the German empire there are incorporated annually since 1890, about 179,000 men, including the one year volunteers. Of this number about 15,000 are assigned to the cavalry arm. Thus the annual assignment to all the other branches amounts to about 164,000 men. The annual assignment to the recruit-reserves and the Landsturm of the first ban can be estimated in round numbers at 200,000.

According to an estimate, which has been made rather below than above what the facts would seem to warrant, the lowering of the standard of measurement to 1.54 meters and disregarding slight physical faults the number of men capable of rendering service would be increased by 100,000 men in round numbers. In order to outnumber the French by a few hundreds of thousands it is not necessary to push the Scharnhorst system to its last extremity and incorporate every man who can be made useful. The finances of the state and of the nation must be spared to the fullest extent possible.

It would suffice to incorporate 70,000 of the most serviceable and most promising of the recruit-reserves and the Landsturm men.

This would give an annual incorporation of 164,000+70,000=234,000

men of all arms—cavalry excepted. To this must be added the cavalry recruits who remain for three years, *i. e.*, 234,000+15,000=249,000 men annually incorporated.

The peace strength calculated upon the foregoing data would sum up as follows: for all arms (except cavalry) 234,000×2=468,000 men. Three annual classes of cavalry 15,000×3=45,000. 468,000+45,000=513,000 men.

But by the increased number of men incorporated each year, the German war strength, which is composed of 24 annual contingents of 249,000 men each, would reach, after deducting 25 per cent. for loss, the enormous total of 4,482,000 men, and would exceed that of the French (4,125,000) by 357,000.

It is evident that we could increase our annual contingent still further without injuring the physical efficiency of our army.

The desire that we should approximate, in numerical strength, to both these great powers, Russia and France, is horrible, but we must be superior to France. We have a perfect right to calculate upon favorable operations on main lines through the use of our network of railroads. Besides the Dreibund holds firm since the fall of Cardinal Crispi. Should that fail us, the initiation of increased annual contingencies would be necessary. I am of the opinion that with this increase we have done all that it is possible to do.

We are still weaker than France in our war strength, but we must always bear in mind, in a certain degree, the fact that our people are less well off than the French.

By fixing the term of service at two years we would not only outnumber the French, but we would excel them in quality, for the necessity the French Minister of War is under to dismiss a portion of their people after a shorter term of service, injures the uniformity of the instruction, and, although the course to be pursued is to be established by law, still it will have the same deleterious effect on the troops that we find in our furloughing system.

The two years' term of service will not injure the political confidence of our troops, but the defective three years' term may do this.

If the proper course is pursued, two years' instruction is sufficient for all branches of the service with the exception of the cavalry.

The changes we have proposed are as follows:

Increase of officers and non-commissioned officers;

Four weeks' drill in the third year;

Reënlisted men with high bonuses on reënlistment;

Increase of the Landwehr skeletons;

Better instruction of the Reserve and Landwehr officers;

Enrollment of the Landsturm.

The two years' term of service as thus sketched out would give us in the future a numerical superiority over the French of 375,000.

Remaining in our present situation we have to look forward to a future minority of 747,000 men.

To determine upon the adoption of the two years' term of service and to demand all that is necessary to carry out the plan is a great undertaking, one of the greatest in this field of reform, which would rank with the deeds of the historic times of Emperor William I.

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LETTERS ON STRATEGY.

By PRINCE KRAFT ZU HOHENLOHE-INGELFINGEN.

Translated by 1st Lieut. Carl Reichman, 9th Infantry.

I.

INTRODUCTION.—WHAT IS STRATEGY?

YOU wish me to write on strategy since I have given you in detail my ideas on the tactics of the three arms.

I must openly confess to you that I comply with your wish with reluctance. It seems an easier undertaking to write on strategy than on tactics: for tactics are usually brought into use in the open field under the pressure of circumstances, often at the risk of life, and the justice of any criticism made afterward at the green * table may on account of this difference be denied. But strategical plans and combinations are usually, even in war, made at the green table and directed from there. The greater part of strategical work consists in written communication (ever since Tiberius ordered it so for the army). Hence one might think criticism as well as theory to be on the same level with practice and of equal weight. But the theorist may lack a main quality which the practical strategist cannot do without. This quality is the strength of character by which, nothing daunted by the fearful responsibility for the lives of thousands of human beings, he coolly makes his calculations though meeting friction everywhere. The tactician has such responsibility too, but not in the same degree nor of the same gravity. He receives the order to attack. He has only to consider how to gain the desired end with the least sacrifices. He is not responsible for the whether or no. But the strategist who must decide whether to fight the battle or to avoid it is accountable whether or not a mass of human lives is to be sacrificed. The tactician is surrounded by danger, or he places himself in the midst of it as soon as he has formed his plan. He shares the fate of those whom he leads into battle. In the worst case he may expiate with his own blood any mistake for which he feels himself responsible. The strategist may not, except in extremely rare cases, share the danger into which he leads thousands and hundreds of thousands of men. In most cases he must keep aloof; indeed he would commit a grave error should he expose himself every time a risk of life is brought on by him and thereby jeopardize the continuity of his measures, the execution of his plans. Only in the rarest cases, in the most critical moments of a decisive battle when it becomes necessary to raise the ardor of his troops, may the strategist place himself amidst the roar of battle and allow it to overcome his feeling of responsibility. Weak characters, men of delicate nerves, may be so crushed by the weight of responsibility, by the recollection of the dead and the wounded suffering in consequence of their actions, that their logic may become considerably impaired when sitting at the green table in council as to the measures to be taken. Do you believe

* *i. e.*, office table.—Translator.

it easier to drive men to their death when you yourself are sitting comfortably in your quarters, than when you are sharing their fate? It might be for a Nero or Caligula, never for a commander of culture and noble mind. A Nero, for this very reason, could never become a Cæsar, a strategist, because he was not a man of noble mind. There have been eminent commanders whose dispositions made on the field of battle, in the midst of danger, withstand the most rigorous criticism to which they afterward may be subjected at the green table, but whose strategic plans made after careful deliberation, are sometimes open to much criticism. (Archduke Charles, 1809.)

Further, on account of the many events and the inaccuracy of news concerning the enemy, nothing is more difficult for a conscientious strategist than a timely persistence in plans once made and in the execution of measures once begun. As sometimes at sunrise on a clear summer morning the mist rising from a damp meadow wraps the ground in obscurity, so the rising mist of contradictory intelligence of the enemy, and subsequent doubts, frequently dim the vision of the strategist who before had calm deliberation and clear vision and had initiated the proper measures.

Hence I consider it very difficult to write correctly on strategy. He only who has gone through all the mental struggles incident thereto, has a right to claim that his views on strategy be accepted. I willingly write you on tactics because on many a day in war I found myself in tactical situations and because I was able to present you my war experiences and aided by them, to apply the proper scale to those of others. In strategy I have much less experience. For I had but little opportunity to be present when strategic plans were made, still less to raise my voice in council. Hence I can hardly present anything else but opinions which I have gained from the study of war history. Anybody can do that. Hence I would probably do better to leave the task to an abler pen.

I have therefore referred you to works already existing. Clausewitz seems to you obsolete. It is true he did not know railroads and telegraphs. But his principles still hold good and the latest inventions can easily be inserted. I referred you to Blume. You blame him because, like Clausewitz, he treats of strategy in too encyclopædic a style without going sufficiently deep into it. You call the strategy by Blume a skeleton without flesh and blood. You are not entirely wrong in that; for Blume did not intend to give anything else but a skeleton, a clever index of strategy. But when I peruse this index I become much frightened at the task you impose on me. Should I fathom the depth of everything the width of which Bloom hints at, I would be kept writing for a period of several generations. And I do not believe you would have the patience to read it.

I have also referred you to Bronsart's "Duties of the General Staff"; they too fail to satisfy you, even by the side of and in connection with Blume. You call them a guide for giving and transmitting orders, *i. e.*, to a certain degree the mechanical part of an artist's work, while strategy is the design made by the artist according to which the work is to be done. You also call them the nerves which transmit to the limbs of Blume's skeleton the ideas according to which they are to be moved, but still lacking

flesh and blood. You also want a statement of these ideas for every concrete case. Thus I referred you to the "Tactic-Strategical Problems" published at Hanover by Th. Mierzinsky and of which eight numbers have appeared since 1884. There you have special ideas for special cases. The author goes deep into the subject.

These problems, too, fail to satisfy you, being too few in number and embracing too limited a field.

Very well then, I will undertake it and begin to write on strategy to the best of my ability. But let me tell you: first read Blume and study the tactic-strategical problems, then place Bronsart's work beside you while reading what I write. For I must lean on these excellent works though I go a different road from them. But do not expect from me an exhaustive treatise, a guide how to practice strategy or even how to become a strategist.

For strategy is not a science; it is an art; one must be skilled in it. This art employs a great number of sciences and arts and the strategist must have an idea of all of them so as to make proper use of them though he need not master them all. It is as easy to write on strategy as on the art of fencing, riding, etc. But no one can ever teach strategy in such a way that somebody else can practice it accordingly. From study alone one can no more become a strategist, than one can learn fencing or riding from books alone. The principal requirement of a strategist is to have the proper quality of character. A strategist must be born as such. He who lacks the proper quality of character, will never be one. Nor is it sufficient to be born one. He has, especially in modern times when so many sciences play an important part in the service of strategy, to do much studying, unless like strategists of former times, he lives to see so many wars that the wide experience he gathers, replaces study or that he studies by undergoing a practical course, which is the same thing. Still, character and study are not sufficient. The character must be tempered by the school of life, study must be chastened by self-gathered experience. Hence, if you mean to become a strategist by reading my views, then you had better excuse me from communicating them to you.

I will tell you in advance how I intend to develop my ideas on strategy and then tell me whether my method is agreeable to you. You know my prejudice for the inductive and against the deductive method. I intend to strategically peruse with you a campaign and then another and still another and so on. How far? preferably *ad infinitum*, that we may be able to collect all experiences that have been had and to draw from the sum of these experiences lessons of the greatest possible extent and correctness. Bronsart is right in saying that only from a sum of similar experiences can a correct conclusion be drawn as to their soundness as a principle. Hence we must find the same feature repeatedly in war history before we may deduce from it a correct lesson. Therefore you must not be angry if I should happen to repeat myself as in my former letters on the three arms. I take the lesson as it is presented by war history. If I draw the same lesson repeatedly and again express an idea already expressed, it only proves how sound it is. Besides I do not write well-rounded and concise works. am writing you letters, discoursing, chatting. If you once make up your

mind to listen to a chatterer you must put up with hearing a story the second time.

On the other hand the study of the strategy of many campaigns will enable us to approximately exhaust the possible strategical situations and to prepare for those with which we may meet in the future. But in this we shall never succeed completely. For the resulting combinations are so manifold that the same "act of war," however small and insignificant, never repeats itself in the same way, as Blume rightly says. He continues: "We seek the leading threads in the changeable events of war presented to us by history, study the nature of the forces coming into operation and their relations to time and space, and try to collect the results gained under common headings in order to gain points as to how to act judiciously in war. When we have mentally placed ourselves in as many situations in war as possible and have discussed the leading motives in the plans made and to be made, then in actual practice, the ground will cease to be unknown, foreign to us; and we shall feel at home, even if the situation in which we are placed is not exactly the same as any one of those which we have studied in point of strategy." "But we only succeed partially in lifting the veil which covers the secrets of war," says Blume.

This circumstance limits considerably the extent of our field of exploration. The study of such wars is useless, the secrets of which as to those moments which actuated the commanders in making their strategic combinations, have not been revealed by history. Hence those wars become useless for our purpose which are too remote in time to give us information of undisputed correctness. To take an extreme case: of what use would be to us a study of the conquest of Egypt by Cambyses, when scholars up to this day have failed to agree on the geographical situation of Naukratis which played a part in it? what lessons in strategy could we deduce from the battle in the Teutoburger forest if we cannot locate the place where Varus was defeated by the Cheruscans?

It is only now that even the wars of Frederic the Great are being written up by the General Staff utilizing the archives of both sides; hence their history does not as yet furnish a satisfactory basis for our investigations. Furthermore on account of the difference of arms, organization and supply of armies the strategy of the last century differs so much from modern strategy that conclusions drawn from it may prove false when applied to the present time. Thus we are limited to the wars of our century. And even among these there are some which we cannot utilize because "the veil covering the secrets of war has not been sufficiently lifted." Who, for instance, would undertake now to enumerate all the motives which actuated the commanders on both sides in the Russo-Turkish war of 1877? why Osman Pasha did not advance further, but intrenched himself at Plevna? why the siege lasted so long?

You may perhaps think that one can nevertheless judge whether this or that action was correct, that it is safe to say that Osman Pasha made a mistake in not pushing forward as far as the bridge of the Russians over the Danube after his first repulse of the enemy, etc., etc.

But that would not serve my purpose at all. For I do not intend to

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criticise. "La critique est aisée, mais l'art est difficile." I do not mean to inquire whether this or that commander made a mistake, or, if a mistake was made whose fault it was, for such sweeping criticism does not promote my strategy one bit. Formerly it was much the custom. When a young lieutenant under the instruction of clever teachers I learned to smile at grave errors of the most celebrated commanders. But that did not advance me one bit. It is only since Verdy has made the applicatory method of study convenient for us that our instructors have abandoned the system of adverse criticism. To detect errors made by a Frederic or a Bonaparte is only in so far useful as we conclude from it, that the practice of strategy cannot be so very easy. Then our judgment of stars of the second and third magnitudes will become milder. Hence we learn that all have made, are making and will make mistakes if even the greatest masters have made them. For a commander becomes his opponent's superior only by making fewer mistakes than he. But for our purpose it is immaterial to know whether this or that blunder was Peter's or Paul's fault, but whenever we find a blunder, instead of "who?" let us ask "what was the cause?" in order to learn what to avoid, how to proceed.

If agreeable to you we will in this way study some campaigns, of which we have sufficient information for our purpose. It will be sufficient to study the development of the campaign up to the first decisive battle. After it the veil covering the secrets of war is much too dense to allow of the leading motives being recognized. If for instance the pursuit after a battle was insufficient, he who reads of it cannot judge what caused it. The condition of the troops, the frame of mind of the commanders and a multitude of influencing circumstances cannot be rendered historically, cannot be described, and many such circumstances no one cares to describe. I might name you a commander who has no small name in war history. He was active, clever, and a hard fighter. Officers of his staff told me that he was so nervous that when once in battle he would never stop. But next morning his nerves were so unstrung that it was late before he could make his dispositions. Now I understand why in studying the history of those actions in which he commanded we invariably find that an early, energetic pursuit next morning is missing. But such things are not put into war history, especially not about a man of his fame. (Compare Blume, p. 170–78, where he describes why frequently there is no pursuit, also Bronsart, p. 510.)

Therefore we content ourselves to study the campaigns up to the first main battle, and when we have illustrated a few of such campaigns as to their strategy, or better when their strategy has enlightened us, then either of us may study by himself as many other campaigns as possible in a similar way. At the same time we will discuss anything else belonging to strategy relative to pursuit and retreat, base and communications, methods of giving orders and administration, etc., etc., and try to illustrate it by examples from history.

When we have forgotten all the details and dates which we have read, then there will remain in our mind a correct strategy as a mental deposit of what we studied. Then provide yourself with the necessary strength of

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character and get yourself entrusted with an army in the next war and you cannot fail to become a great strategist.

Perhaps you deem it necessary to lay down what strategy is before I begin to write on it. Strategy is * * * no! the word has already been defined often enough. Clausewitz says: Tactics is the use of troops for the purpose of battle, strategy is the use of battle for the purpose of war. Blume calls tactics everything relating to the use of troops in battle and regulating their action according to the requirements of the battle, and strategy everything else in the art of war not belonging to tactics (p. 33).

At another place he says (p. 151): The use of troops in battle belongs to tactics and forms its main part. To determine when and for what purpose to engage in battle, to get the necessary forces ready and to profit by the result, belongs to strategy.

Both authors, of which the former has been an authority for a long time and the latter will soon be one, oppose tactics and strategy one against the other. This does not agree with the verbal translation of the terms which mean: "troop leading." The Greeks, too, applied this meaning to the term, for when the Athenians chose a *strategos* he was simply their leader in battle. Hence they did not separate tactics from strategy. Nor do all modern civilized nations appear to attach to the word the same meaning as we Germans do. At least I found a wide road around Paris connecting the gorges of the detached forts. On the map this road was called *route stratégique*, though in defense of the fortress it could subserve but tactical purposes. However that may be, Germans have adopted that term which has been cleverly defined by Clausewitz and accurately explained by Blume. I consider such definitions simply as an amusement of the mind with words. But such amusement becomes hazardous when deductions are drawn from this play of words as by Hegel's school of philosophy, for the definition must always leave gaps because it turns out too short and because language is too poor to exhaustively express copious thoughts in a single sentence. Thus Clausewitz's definition leaves a gap by limiting the term strategy toward tactics only, downward as it were, but not upward toward politics. Hence we want a definition of politics in war, which in connection with Clausewitz's definition, ought to read: politics in war is the use of war for purposes of state.

Blume thinks we might consider tactics subservient to strategy in the same sense that strategy is subservient to politics. But the contrary also happens. Blume therefore is right in saying that strategy finds its limits in what is tactically possible and that the result of tactical decisions is the main factor of calculation with which it reckons. Hence where the result of tactical decisions fall short of what was considered possible, or surpasses it, strategy must be modified and is then subservient to tactics. This is still more the case when a tactical decision must be sought and on its account strategy must be charged to assemble as much force as possible. For it is a well-known principle that one can never be too strong for a decisive battle. The same way it has frequently happened that politics were subservient to strategy, while, properly, strategy ought to be subservient to politics. The results of strategy limit or extend the aim of politics, thus politics be-

come subservient to strategy. But politics appear entirely subservient to strategy when the latter requires that the former be obliging and yielding toward a neutral in order to gain its strategical assistance.

It may also happen that politics and tactics come into mutual relations. If diplomatic negotiations need to be emphasized by some success of arms, politics may instantly order a battle not at all required by strategy. A certain monarch who for tactical and strategical reasons was advised not to assault a fortress, replied: "tactically and strategically it may be a matter of indifference whether or not we take this fortress. But I need an assault on a fortress in order to show to the world that my troops are still able to carry a fortress by assault and to have my army respected accordingly."

On the other hand it often happens that politics become directly dependent upon tactics. The diplomatic language as used after a victorious battle, sounds quite differently from the one used after a lost battle. But there are also exceptional cases when politics must act in the service of tactics. Such a case we saw in 1864. Politics required us to abstain from crossing the frontier between Sleswig and Jutland. On arriving at that frontier we found before our outposts Kolding—belonging to Jutland and commanding the country to a great distance—occupied by the enemy. Tactically it was impossible to omit the occupation of this commanding position as it would seriously imperil the position of our troops, especially our advanced guard. Thus tactical considerations compelled us to occupy Kolding at once, and politics, *i. e.*, diplomatic negotiations, afterward had to procure us immunity for this step. A similar case happened in the most recent times on the frontier between Merv and Afghanistan. Komarow, for tactical reasons, could not leave the Afghans who were swarming around him, unmolested at Penshdeh. He defeated them and it became the task of politics to justify this act afterward, *i. e.*, to aim at what corresponded to this tactical act.

Now if politics, strategy and tactics must always coöperate, it is evident that the greatest results are obtained when the highest political, strategical and tactical authority is united in one person. After the wars of 1866 and 1870–71 we Germans need no further proof of this. That politics must stand in harmonious coöperation with strategy and tactics seems so simple and clear that one cannot help being surprised how frequently this fundamental principle is disregarded. Prussia's disaster of 1806, Austria's of 1859, France's of 1870 were the results of it. In all these three cases the government of the army and the civil government, politics and strategy, were not united in the same hand (cp. Blume, p. 32).

What diplomacy is in politics, the general staff is in strategy. The government orders, diplomacy has to carry out the details, the commanding general orders, the general staff has to work out the details. Hence the action of the general staff is as essential a part of strategy as that of diplomacy is to politics. Indeed the duties of the general staff are mostly identical with strategy, as those of diplomacy are with politics. Hence an exhaustive study of the duties of the general staff must embrace strategy. Though Bronsart modestly says that his work does not absolutely answer all the scientific requirements, still you find in his work on the duties of the

general staff all the questions which Blume treats scientifically. In a certain way Blume represents the theory, Bronsart the practice.

Looking at both books you will recognize the enormous extent of all those things in science and practice which strategy must embrace within its limits or take into its service. It is not sufficient to know about the organization of one's own or foreign armies, the mode of issuing and transmitting orders about dispositions, instructions, tableaux of operations and reports of all kinds, marches, camps, cantonments and bivouacs, supply departments, supplies of arms, ammunition, clothing, etc., to be able to reconnoitre and sketch, to be well informed on battles and engagements,—the strategist must also know about railroads, telegraphs and care of the sick, he must be able to understand statistics in order to determine how strongly a country is to be occupied and what supplies it can furnish, indeed he should know about the administration of a conquered district until the officials arrive who are to carry on the administration. He must also be well informed about everything concerning fortresses. But it is not necessary that all branches of strategy be thoroughly mastered. A strategist for instance need not be an engine driver or an expert on fortifications. But he must be able to judge of the capacity of a railroad, to measure the value and power of resistance of any fortress according to its situation, construction and garrison.

The extensive field of strategy is, in my opinion, sufficiently discussed by Bronsart and Blume. The former gives a book of reference, the latter an extract of the same. Neither of the two books is agreeable, entertaining, light reading. On the contrary he who wants to profit from them must anticipate hard study and severe brainwork, in which he must often pause in order to get a thorough understanding of all he reads. I for my part cannot read attentively in Blume's work for more than one hour without pause. If I understand you aright, you wish me to proceed differently from these two, else I could not do anything better than to copy them. Therefore I have adopted the method above referred to. I will supply toothsome butter to Bronsart's dry bread, piquant sauce to Blume's nutritious meat and gather lessons in strategy, like many colored flowers, on the field of war wherever I come across them.

I do not think you want me to give a certain and accurate system of strategy. Such systems, which like universal remedies ought to be applicable to all cases, have been laid down by some authors. For instance the strategy of interior lines when entirely surrounded by enemies, which in the case of Frederic the Great proved so successful but was the result of his situation. Thus when in 1813 the allies surrounded Napoleon and hunted him down, a system of surrounding the enemy was manufactured. Such a system, however, could hardly be deduced from the conduct of the War of 1870–71 by the Germans. At first pushing their masses like a wedge between Bazaine and MacMahon, they seemed to act on the system of interior lines, later on in the actions indicated by the names of Metz and Sedan, on the system of surrounding. Finally during the blockade of Paris, when campaigns were made in all directions against armies coming to the relief of Paris, we might again speak of a strategy of interior lines.

XUM

But still there are certain axioms for strategy which must never be lost sight of in war. I propose five of them:

1. Politics must be intimately connected with strategy.

2. The first object is to overcome the enemy's army; everything else, occupation of countries, cities, is of secondary consideration.

3. For a decisive battle too many troops can never be assembled. The aim of strategy should be to concentrate for this purpose as many troops as possible and for secondary purposes never to use more than are absolutely necessary (Blume, p. 157).

4. One must never adhere blindly to one system, but always use common sense and do what brings about the desired result in the shortest way.

5. Any change in the strategic arrangements once made, leads to incalculable loss of time and strength. Hence such changes must be avoided unless rendered necessary by events affecting the enemy, or by the elements, etc. A sudden and groundless change of plans on the part of a commander has often caused grave disaster. The best is opposed to what is good.

Even when following these strategic axioms most accurately war still remains an uncertain venture. Hence strategy must forego being certain of success beforehand. A strategist who does not take risks, cannot gain great results and, since war is an uncertain venture, he would do better to leave war alone altogether. When to risk and what to risk is a matter of judgment.

But such judgment must not be a partial one, but ought to embrace everything that can be anticipated. Nothing, not even the most annoying movements of the enemy, should surprise the strategist. He must previously have considered anything that may happen and be ready with a remedy. This requires a command over the situation such as falls to the share of but few men, and a comprehensive mind in addition to a strong character.

Only in this way will the strategist succeed in laying down the law to his opponent.

In no strategy has this been carried out so masterly as in the command of the German armies in 1870–71.

The above axioms in strategy will hold good as long as the present notions of peace and war, politics and strategy obtain. Even inventions of new engines of war (dirigeable balloons) will cause no more alteration than the latest inventions (railroads, telegraphs, rifled guns, dynamite, etc.) have caused.

Perhaps you laugh at my idea that the conceptions of peace and war, politics and strategy might be changed. This idea has struck me recently. We have seen a campaign without previous declaration of war or subsequent treaty of peace (Alexandria, Egypt). In another part of the globe a war took place, when both parties persistently asserted that they were not at war but at peace with each other. However afterward they deemed it necessary to conclude a peace (Tonkin, China and France). Finally we have seen a battle take place without a war (Penshdeh); it is true a similar case happened 30 years ago (Bronzell). On such points I shall have to be silent in my comments on strategy; they are not suited to it. But such events have caused me to think that some day different ideas might be associated with the words war, peace, politics, strategy.

THE FIELD GUN OF THE FUTURE.*

(Apropos of the recent work by General Wille.)

BY GASTON MOCH, CAPITAINE D'ARTILLERIE.

Translated by CAPTAIN FREDERICK A. MAHAN, Corps of Engineers.

(Continued* from JOURNALS Nos. 59 and 60.)

IST PART.—GENERAL PRINCIPLES OF THE SYSTEM (*continued*).

V.—*Initial velocity and calibre of the Wille gun.*

HAVING given the relation which exists between the weight of a gun, of its projectile and the initial velocity of the latter (§16), we will now endeavor to see whether it be possible to reconcile the values given these three quantities in the Wille project. The answer will be a frank "no" in the present state of manufacture, and probably even, until a still far distant future.

The question may be studied in two ways. In the first place, the effectiveness demanded of the gun may be compared with that of existing cannons; it will then be noticed that this effectiveness is out of all proportion to what has been done up to the present time, and that it would demand a degree of progress which is very unlikely for the time being. But it has already been shown how elastic this consideration of effectiveness is, and what risk there is of going astray if too much importance be attached thereto. Therefore we will complete the study by trying to show to what pressure the gun would be subjected when its calibre and the initial velocity of its projectile are given; this information which is much clearer will lead to the same conclusions.

27.—A projectile weighing 6.5 kg. (14.3 lbs.), hurled with a velocity of 800 m. (874.8 yds.), has a living force of 212,000 kgm. (684.5 ft. tons), and if the gun only weighs 400 kg. (882. lbs.) the effectiveness will rise to 530 kgm. per kilogramme of the gun (1739 ft. lbs. per lb.); one can do no better than to adopt on this score the expression of the *Militär Wochenblatt* when it says that "it is on this number that the *Gun of the future* is bound to come to grief."

In the interesting numerical tables which add such value to his work, the general shows the historical development of each important element of all the European artilleries, going back in the case of Prussia even to 1816. Suffice it now to seek the advance made in France and Germany since the models with which the War of 1870-71 was waged. This is brought out by the following table, which refers to the mounted divisional batteries:

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*To the articles already mentioned should be added a new reply by General Wille to No. 110 of the *Militär Wochenblatt* in No. 5 of 1892.

In No. 770, for January, 1892, the *Revue Militaire de l'Étranger* began a study of this subject in which the conclusions are similar to those here given, in so far as they are in common.

		FRENCH GUNS.			GERMAN GUNS.		
		4c field guns.	7c bronze.	90 mm.	9cC. 61 Prussian.	9cC. 73.	9cC. 73/78.
Weight of the gun.....	kg.	330	650	530	425	450	420
Weight of the shell...	kg.	3 660	7 105	8.660*	6 900	7.022	
Initial velocity..... ...	m.	325	390	432	322	442	
Initial living force.....	kgm.	19703	55079	82372	36464	69992	
Effectiveness of the gun.—kgm. per kg.		60	85	155	86	156	167

1 kg. = 2.2, 1 m. = 3.28 feet, 1 kgm. = 7.233 ft. lbs, 1 kgm. per kg. = 3.26 ft. lbs. per lb.

It is hard to compare the French guns with each other on account of their great differences in calibre. But this is not the case with the German pieces, and there we see that the effect of adopting hooping and coarse grained powder has been to raise the effectiveness from 86 kgm. to 167, that is, to increase it 92 per cent.

28.—But, very recently, azotized powders have allowed the initial velocity to be greatly increased, without exceeding the pressures for which the guns were built. It is thus that, confining ourselves to the experiments made with field guns using Nobel powder in Germany, and B N powder in France, the following results have been reached; those from the Krupp factory being taken from General Wille's work*:

	KRUPP GUNS OF				GRUSON GUNS OF			
	7c.5 of 27 cal.	7c.5 of 28 cal.	8c. of 26 cal.	8c.4 of 27 cal.	7c.5 of 30 cal.	8c of 30 cal.	8c.2 of 26 cal. (bronze).	CANET GUN 7c.5 of 32 cal.
Weight of the gun, kg	300	411	404	460	360	450	436.5	359
Weight of the projectile, kg..	4.430	6.800	7.000	7 000	7.000	7.000	7.000	4.6
Weight of the charge, kg....	0.430	0.700	0 890	1.000	0.700	0.990	0 850	0 900
Size of grains, mm..... ..	2	4	5	5	4	5	4	.. ....
Initial velocity, m.....	333	348	360	389	300	380	330	659
Living force, tm.....	69 1	104.1	111.9	123.8	89.1	120	100.2	101.8
Effectiveness of the gun, kgm. per kg..	230	253	277	269	247	267	230	284
Maximum pressure kg. per cm2	1995	2169	2071	2278	2066	2066	1963	2372

1 kg. = 2.20 lbs. 1 m. = 3.28 feet, 1 mm = 0393.
1 tm. = 3.228 ft. tons, 1 kgm. per kg. = 3.26 ft. lbs. per pound.

*Grape-shot shell (*obus à mitraille*).

†It is well to notice in this connection that, while, in France, the word atmosphere is in common use as an abridgment of the sensibly equivalent expression of "pressure of 1 kilogramme per square centimetre," the term is used with strict accuracy by German authors, and hence corresponds with them to the pressure of 1.033 kg. per cm2. In reproducing their data, they are made comparable with the French data; the correction is about 80 kg. for normal firing pressures.

Thus the effectiveness of the field gun, which is less than 170 kgm. per kg. (558 ft. lbs. per pound) in the German field gun, has been brought to 277 kgm. (909 ft. lbs per lb.) with Nobel powder, representing an advance of more than 60 per cent. The gain is already great; but it can be surpassed without any doubt in the future. Since the experiments just given, the Krupp factory has obtained an effectiveness of 285 kgm. (935 ft. lbs. per lb.) with its 10.5 c. gun (4.13 in.) of 35 calibres; but merely stating the calibre and length of this piece is sufficient to show that it cannot be compared with field guns.

As to the Canet gun, it has given an effectiveness of 284 kgm. (931 ft. lbs. per lb.); and the use of regulation instead of B N powder would have raised this number or lowered the pressure. If the B N powder should be used the first effect would undoubtedly be taken as the gun can stand the pressure of the experiment perfectly well. Hence it is to be noticed that with the same weight as the Gruson 7.5 c. (2.95-in.) gun, this piece is 2 calibres longer and fires at 300 kg. (661 lbs.) greater pressure.

29.—In the way of field guns the greatest effectiveness obtained by Krupp is 277 kgm. (909 ft. lbs. per lb.) for the 8 c. (3.15-in.) gun. Let it be assumed with the *Militär Wochenblatt*, that industrial advance will soon produce a piece of smaller calibre with an effectiveness of 300 kgm. (984 ft. lbs. per lb.) If it only weighs 400 kg. (882 lbs.) like the Wille gun, the living force of its projectile will be 120,000 kgm., scarcely one-half of that proposed by the general. That granted, if its projectile weigh 6.5 kg. (14.3 lbs.) the initial velocity cannot exceed 609 m. (666 yds.); if on the contrary, the velocity of 800 m. (874.8 yds.) is to be preserved the weight of the projectile must fall to 3.67 kg. (8.09 lbs.) Finally, if with this effectiveness of 300 kgm. (984 ft.-lbs. per lb.) it be desired to realize a living force of 212,000 kgm. (684.55 ft. tons) the gun will have to weigh 700 kg. (1543 lbs.) and not 400. And again to reach these results, so far from the figures of the project, it must be supposed that an effectiveness has been obtained far greater than any yet given by azotized powders themselves in 7 c. (2.76-in.) guns.

Within what limits then can it be hoped to increase the effectiveness of a piece of given calibre and in what way can it be reached? The weight of the projectile being given, the question amounts to asking how the initial velocity can be increased without exceeding the maximum pressure allowed for the gun. We are thus led to substitute the consideration of internal pressure for that of effectiveness; it really amounts to the same thing, but it is infinitely more simple to conceive and is a guide with which there is less risk of going astray.

30.—The consideration of the mean pressure on the base of the projectile gives the means of forming an idea of the maximum pressure which will be developed in a gun, knowing the weight of the projectile, the initial velocity and the nature of the powder used.

It is known that by mean pressure on the base is understood the constant pressure capable of communicating to the projectile, during its passage along the bore, a velocity equal to the velocity which this projectile actually possesses as it leaves the mouth of the piece.* Calling p the weight

* *Cours de balistique intérieure*, by Captain Roulin, §155 *bis*. It is interesting to notice that this very classical idea is passed over in silence in the German works of instruction; this is what the *Wochenblatt* sets forth at great length.

of the projectile, V its initial velocity, w the area of right section of the bore, u the length traversed by the projectile, this pressure is given by the equation:

$$P = \frac{\phi V^2}{2g w u}.$$

It is easy to verify that, for a given powder and with the same length of bore the ratio of the maximum pressure to this mean pressure is determined sufficiently nearly at least to serve as a basis for a close calculation; in this way is obtained the following table for the two field guns using C_1 powder:

	80 mm. gun.	90 mm. gun.
Initial living force..... kgm.	69,210	82,372
Distance travelled by projectile..... m.	1.7135	1.6695
Right section of bore..... cm^2	51	64.5
Mean pressure..... kg. per cm^2	792	765
Maximum pressure..... kg. per cm^2	2300	2200
Ratio of these two pressures.....	2.9	2.9

6.45 $cm.^2$ = 1. $in.^2$

It can thus be foreseen that for a gun like our field pieces using C_1 powder the maximum pressure will be very nearly 2.9 the value of the mean pressure, this latter being deduced from the quantities ϕ, V, w and u, supposed to be known.

It is not for us to say how far the coefficient 2.9 should be changed to answer for the French smokeless powder; but it is interesting to make this comparison for the Nobel powder, from the discussion in the *Militär Wochenblatt*, the elements of which, taken from General Wille's book, are really the results of the experiments at the Krupp establishment. From these it follows that, in the German field gun the mean pressure on the base of the projectile is 711 kg. per cm^2; the maximum pressure is 1900 kg. or 2.7 times as great, whence it follows that the coarse grained German powder is slightly more progressive* than the C_1 powder for the same length of bore. As to the Nobel powder, the value of its maximum pressure stands at about 1.7 times that of the mean pressure.

31.—This granted, it would be easy to say what would take place in a Wille gun if all the necessary numerical data were at hand. Unfortunately they are not. As the General has avoided in his work touching on the very interesting question of maximum pressure, so also he gives no information as to the length of the breech mechanism or that of the chamber of his gun; this last "will have to be determined empirically." Hence there is no certainty about the length travelled by the projectile. To start with something, the *Militär Wochenblatt* assumes that the length may reach 2.40 m. (7.87 ft.). This value seems to be exaggerated; in fact it will be seen further on that the length of the powder chamber alone is estimated at 70 cm. (27.6 in.) the closing of the breech being by a wedge demands a relatively great

*By this term *progressive* is meant *gradual in action*.

length back of the powder chamber, exceeding 20 cm. (7.87 in.) in the Gruson system, which is adopted by the general. Assuming that the length of the chamber, 70 cm. (27.6 in.) is exaggerated, it is considered that the *cannon of the future* will be fairly treated by giving the distance travelled by the projectile as 2.00 m. (6.56 ft.). The difference between this number and 2.40 m. is not to be neglected, as will be seen.

Be that as it may, it seems, as the *Wochenblatt* says, that the general has thought too much in his work of the 8.4 c. (3.3 in.) gun of 40 calibres, which he mentions especially among those of the Krupp establishment, and which has given a 7 kg. (15.4 lbs.) projectile a velocity of 746 m. (816 yds.), or a living force of 200,500 kgm. (647.42 ft. tons) with a pressure of only 2169 kg. (4771.8 lbs.). But he cannot have taken into consideration that the projectile has an available right section of 55 cm^2 (8.53 in^2) and travels over a length of bore of 2.85 m. (9.34 ft.); hence the mean pressure on the whole base is 70,360 kg. (227.19 ft. tons), or 1270 kg. per cm^2 or finally 1.7 times weaker than the maximum pressure. "In the Wille project the living force is sensibly the same, 212,000 kgm. (684.55 ft. tons). Only the length of the bore traversed is 2.40 m. (7.87 yds.) at most (about 16% less); hence the average pressure is 90,392 kg. (291.88 ft. tons) on the whole surface of the base (29% more); and as the right section is only 38.5 cm^2 (5.97 in^2) (30% less), the average pressure per cm^2 rises at least to 2349 kg.* (5167.8 lbs.). There is no denying this fact that the mean pressure is three times that of the heavy field gun, and even exceeds the maximum pressure given by black powder. As to the maximum pressure, supposing that it be to the mean pressure in the same ratio as for the Krupp 8.4c. (3.3 in.) gun, it would nearly reach 4000 kg. per cm^2 and hence would be more than double that of the field gun model of 1873. And there is the extent to which General Wille is mistaken in his calculations!"

32.—This last phrase has put into the author's hands a convenient reply, but one which does not seem to weaken the preceding contention. Here it is in a few words:

"The general is not mistaken in his calculations for the reason that he has refrained from giving any value for the maximum pressure in his gun. He has been content to say that azotized explosives are as yet in their infancy, and that so soon as the outline of the piece which suits them shall have been found experimentally, the velocity of 800 m. (874.4 yds.) and even more, will surely be obtained without excessive pressure. It is not without good reason that he has avoided a definite figure. Naturally the average pressure can be calculated, at least very closely; but this does not measure the stress which will have to be used as the base of this outline. The pieces in which the pressure firings with the new powder were made were built for black powder. Besides it is not known at all whether the crushers really give the maximum pressure; this point will only be settled

*Perhaps these numbers are quite below what the Wille gun would give. In fact, if, as has just been foreshadowed, the travel of the projectile be reduced to 2 m. in this piece, the mean pressure rises to 2753 kg. and the maximum pressure, 1.7 times as great, to 4680 kg. and it will be seen in §36 that the chances are few of the coefficient 1.7 being soon reduced, at least in a gun of 40 calibres.

when the motion of the projectile throughout the whole length of the bore shall have been successfully studied. It will be enough if the inevitable improvements of the new powders give the means of reducing to 1.4 the ratio of the maximum to the mean pressure in order to find no longer 4000 kg. (88,000 lbs.) as a maximum, but 3300 kg. (7260 lbs.), a pressure which agrees with that of the later rifles and which has been constantly exceeded for a long time in guns of great calibre.*"

Moreover General Wille willingly grants that his gun will be subjected to very violent strains. But he thinks that the great progress made in the manufacture of steel during the past twenty years are but an earnest of new ones to come. On the other hand, let the development of azotized explosives be completed, the time will soon come, in his opinion, when the effectiveness of 530 kgm. per kg. (1739 ft. lbs. per lb.) of the piece will no longer be considered utopian; it will suffice to give the problem of the construction of a gun, according to the data of the project, to competent establishments for them to succeed therein, not at once probably but within a relatively short time. * * * And the general concludes, in a somewhat mysterious way: "For reasons of form rather than of fact, I must unfortunately refrain yet longer from furnishing precise or numerical data as to the means to be employed; but I hope to be able soon to satisfy in this respect the curiosity of all who are interested."

33.—So vague an answer gave the *Wochenblatt* a fine chance. In its reply in No. 100 it calls to mind that, if from 1861 to 1891, the effectiveness of guns could have been raised from 85 to 285 kgm.,† there is still a long journey to make before it can be brought to 530 kgm.; it is then satisfied to notice what the general has assumed in his book that a "near future" will see a still greater advance than that which has been the work of the past thirty years. The counter-project which has been developed in the *Wochenblatt*, and which will be given further on has, says this journal, the advantage that it can be realized at once; one might be satisfied if it were realized two or three years hence, as it would increase the power of the German field gun 80%; as to the *Cannon of the future*, which represents an advance of 200%, it will come in its day, but that day is surely afar off.

The *Allgemeine Militär-Zeitung* had also denied the possibility of constructing now a 7c. gun which should give its projectile a living force of 212,000 kgm. and should only weigh 400 kg. (880.0 lbs.). In his reply to this paper the general has allowed himself the easy pleasure of placing opposite each other the powers assumed by the two journals for a 7c. gun (2.76 in.) and adds ironically that he leaves his reader free to select either series of values,—unless he should prefer to take neither.

It might have been better perhaps to seek the point of view from which the criticism of the *Allgemeine* could have been taken. For this it is sufficient to refer to the table of the Krupp experiments (Wille, p. 287). It will be seen that the extreme effectiveness obtained are 169 kgm. per kg. of metal (6c. 40 cal. gun), and 277 kgm. (8c. gun already mentioned). While

*So far as we are concerned, we have never heard of heavy calibre guns in connection with which pressures of more than 3300 kg. can be considered "habitual."

† Or rather 277 kgm. if only field guns tried in German establishments are considered.

saying that a living force of 212,000 kgm. (684.55 ft. tons) would require for the 7c. (2.76 in.) gun a weight of 950 kg., the *Allgemeine* has admitted an effectiveness of 223 kgm.; now this number is exactly midway between the extreme values obtained by the Krupp experiments; perhaps it was chosen the more willingly because, by a remarkable coincidence, the calibre 7c. (2.76 in.) is also exactly the mean between the two corresponding calibres.

All that can be said is that this reasoning implies extreme prudence; on the other hand the reasoning of the *Wochenblatt*, which requires of 700 kg. (1540 lbs.) for the gun, already makes a concession to the general, as it admits an effectiveness of 300 kgm., which is 23 kgm., or 8.3 per cent. greater than the highest value of which it has knowledge. Of these two authors one has held to the mean while the other has scarcely gone beyond the extreme limits of effectiveness already obtained with the Nobel powder, while their opponent supposes that there have been acquired results compared with which this extreme limit is but child's play.

35.—From what has just been seen, present industrial conditions give no grounds for hoping that the fundamental data of the Wille project will soon be realized; but on the other hand the guns of to-day correspond to the conditions of science twenty years ago. Hence it must be asked how and to what extent progress may be possible. By means of this search a certain number of principles will be seen to stand out, somewhat confused perhaps, and the lack of knowledge of which explains how the temptation has arisen to ask from field guns a ballistic power which must be renounced for a long time to come.

Let the question of calibre, supposed selected, be set aside for the nonce, and let it be proposed to increase the effectiveness of a gun, its weight and that of its projectile being determined by service conditions. The problem amounts to increasing the initial velocity, or to increasing the mean pressure bearing on the projectile.

Three methods, to be examined separately, may be used for increasing the mean pressure without compromising the piece: improve the powder, increase by any means the strength of the piece, or lengthen the travel of the projectile in the bore.

36.—Improve the powder, this has just been done; and it may be hoped, without running the risk of being treated as a routinist, that a second step of the same importance is not about to be taken. The mistake of many persons is in thinking that the new powders sprang up suddenly, by a sort of spontaneous generation. In this case there is no reason why a second similar phenomenon should not be expected. The truth is that azotized organic explosives of high power have been known for forty years, and there has been a constant search for the means of adapting them to fire-arms ever since; it was after long and methodical studies that "at the end of 1884 a general method, giving the means of regulating their mode of combustion and applying it to an arm of a given calibre, was found at the central Laboratory of powders and saltpetres. * * * The result of this substitution was to put at the service of the artillery the most powerful explosives at present known. It follows from this that the adaptation of fire-arms of some other explosive now known would only involve some improvement in

detail for the armament, and that a new advance, comparable with that which has recently taken place, can only be had by the discovery of explosives of the type wholly different from those which chemistry places at our disposal to-day."*

Thus, what we have at hand now, is the complete utilization of the most powerful explosives known. Better will doubtless be found some day, but when? This is the constantly recurring question brought up at every point by the *Cannon of the future.*

Moreover, there is no longer very much to gain. It seems very simple to say (§ 32) that it would be sufficient to reduce the ratio of the maximum to the mean pressure from 1.7 to 1.4. The reality is that this advance would be quite great.

The ideal toward which powder makers are working would be really to make an explosive in which this ratio would be equal to 1, that is to say, of which the curve of pressures would be a horizontal straight line. But like every ideal, this one cannot possibly be attained; it is forbidden even for pneumatic guns. The pressure must necessarily increase until the moment that the projectile starts, and should it remain constant from this instant the ratio would still be greater than 1. There is nothing rash then in affirming that as this limit is neared advances will be more and more slow, as always happens in such cases; whence it follows that recent as the azotized explosives are, their destiny is not to give much greater results than they have given up to the present time.

37.—To increase the strength of the gun, either its system of construction may be improved or a stronger metal may be used.

As to the former we still think that the best solution consists in the use of a wrapping of steel wire, which gives the further real secondary advantages of cheapness and easy execution. This mode of construction is still under study in England and Russia, through the patient efforts of its inventor, Mr. Longridge.

In this system a maximum pressure of 2800 kg. (6171.2 lbs.) has no terrors for a field piece; assuming, the ratio of 1.7 between this and the mean pressure, as the result of the use of an azotized powder, a value of 1647 kg. would be reached for this latter,—rather more than that of our 80 mm. (3.15 in.) gun, but still much below that of the Wille project. It has been seen (§ 31) that the latter is estimated by the *Wochenblatt* at 2349 kg. (5167.8 lbs.), but it has been shown that very likely this value is still quite below reality and exceeds perhaps 2750 kg. (6050 lbs.). Raising the maximum pressure in a wire-wound gun to 3000 kg. (6600 lbs.) the mean pressure would still be only 1765 kg. (3883 lbs.)

As to the metal for guns, it does not seem easy to improve it to any great extent. The discussion by General Wille of this subject will be mentioned further on. Good results may be hoped for perhaps from the Mannesmann process, the originality and advantages of which have been pointed out to the readers of the Review†; but taking things at their best, its wholesale application to the construction of cannons evidently demands much

* *Mémorial des poudres et salpêtres*, t. III., p. 11 and 12.

† See *Revue d'Artillerie*, November, 1890, Vol. XXXVII, p. 161.

preliminary study; here again it cannot be foreseen how long we may have to wait.*

38.—Lengthening the gun, as a means of increasing the initial velocity and utilizing more fully the expansion of the gases, now remains to be considered.

So long as the calibre is untouched, this solution is inapplicable to field guns; if the admissible weight is not to be surpassed, compensation should be found in a reduction of thickness, which involves an improvement of the metal or of the system of construction. On the other hand, if the calibre be reduced, the means are obtained for giving the tube a shape like that of the present sea guns. The question is, to know how far this road may be followed.

Let it first be noticed that the Wille project has, as always, gone to the extreme possible limit and, perhaps, even a little further. As the length of field guns is only limited by conditions of service, pieces of different calibres may be compared on this ground. Our 80 mm. (3.15 in.) and 90 mm. (3.54 in.) guns are both 2.28 m. (89″.77) long; in other countries the horse batteries have a shorter piece than the mounted batteries. Taking only the latter into consideration the following lengths are found: England, 2.346 m. (92″.36); France 2.28m. (89″.76); Germany and Russia 2.100 m. (82″.68); Austria 2.06 m. (81″.10); Italy 2.050 m. (80″.71). The mean of these values is 2.156 m., and one needs only to examine these numbers to feel that the general is not mistaken in foreseeing that objections would be made to the value 2.8 m. (110″.24) which he proposes. These objections bearing on conditions of service will be spoken of again in connection with details of construction of cannon, and this great length will be accepted for the time being.

Unfortunately that will not be enough yet to obtain the proposed ballistic conditions. In this respect the example of the Krupp 8.4 c. (3″.30) 40 calibre gun, far from being an encouragement, might rather have served as a warning.

In fact this piece develops a living force of 200, 500 kgm. (725 foot tons); now it follows at once from the formula §30 that, to obtain a given living force with a gun of a less calibre, the length of the piece must be increased in inverse proportion to its calibre; for what interferes here is not the relative length (that is in calibres) but the real absolute value of the length. That granted, if only to reach this ballistic power (which moreover is 11500 kgm. (41.6 foot tons) less than in the project), the gun would have to be more than 4 metres (157″.48) or 59 calibres long. It is true that the pressure of 2169 kg. (4783 lbs.) of the Krupp gun must seem very small to the author, but even by going far beyond it, one is still far from the 2.80 m. (110″.24) of the project.

39.—At this point the question of the length of bore leads back to the determination of the calibre.

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*General Wille says in his work that a Mannesmann tube has been made for a 12c. gun; but it is not known whether this tube has been finished and fired; even granted that it has been; this one experiment presents only a presumption, and not a definite certainty of the possibility of doubling the pressure on pieces now in use.

The calibre cannot be reduced with impunity if the exacting conditions of firing are to be preserved in the matter of the velocity and weight of the projectile. It must not be forgotten that if two similar pieces are to fire with the same velocity and the same pressure they must be similarly loaded. Now, if the mere giving of their lengths of 40 calibres be alone considered, the Krupp 8.4 c. (3.3 in.) gun and the Wille 7 c. (2.76 in.) gun may seem similar at the first glance; let us see what is the real state of the case and whether they are similarly loaded.

In reality the lengths are not even proportional to the calibres, for the travel of the projectile, and not the total length must be considered. Now the 7c. (2.76 in.) gun must fire 1500 grammes of powder (3.3 lbs.) (against 1600); hence the length of the chamber will have to be greater, not only in relative value, but even in absolute value, on account of its less diameter. But this point, which would only strengthen the argument, will not be dwelt on, and two travels proportional to the calibres will be supposed.

That granted, in order that the two pieces should be similar, and that the same velocity and pressure be obtained, all the weights would have to be in proportion to the cubes of the calibres.

As the 8.4 c. (3.3 in.) gun weighs 1050 kg. (2310. lbs.), the 7 c. (2.76 in.) should weigh 608 kg. (1337.6 lbs.); it only weighs two-thirds of that or 400 kg. (880. lbs.) and hence it will be much weaker. On the other hand its loading conditions are much harder.

The projectile which from 7 kg. (15.4 lbs.) should fall to 4.050 kg. (8.9 lbs.) weighs 6.5 kg. (14.3 lbs.), that is 60 per cent. too much. Not content with that, it is proposed to exceed the initial velocity of the 8.4c. (3.3-in.) gun by 54 m. (59 yds.) (more than 7 per cent.) and, to this end, instead of reducing the load from 1600 g. to 926 g., it is made 1500 g., that is to say 62 per cent. greater.

The 7.5c. (2.95-in.), 40-calibre Krupp gun, the trials of which are more recent, has shown itself to be superior to the 8.4c. (3.3 in.), which, moreover, is far from holding the first place among those with which the general is acquainted. But this superiority is as nothing when compared with the distance which still separates it from the cannon of the future.

It weighs 697 kg., that is proportionally less than the 8.4c. (3.3 in.); its projectile weighing 6 kg. (13.2 lbs.) is relatively heavier; on the other hand the initial velocity is less, 706 m. (771.6 yds.), although the pressure reaches 2319 kg. The initial living force of 152, 430 kgm. (502.2 ft. tons), assures it an effectiveness of 219 kgm. as against 191 kgm. of the 8.4c. gun.

A 7c. gun similar and similarly loaded, would weigh 567 kg. (1250 lbs.); its projectile would weigh 4.878 kg., and the load of 1.081 kg. would give a velocity of 706 m. (771.6 yards) with a pressure of 2319 kg. It is easy to see which way the Krupp factory would have to go in order to be able to realize the Wille project.

The task would be equally hard for the Forges et Chantiers de la Méditerranée whose 75 mm. (2.95 in.) 32-calibre gun, mentioned in the table of § 28, exceeds the Krupp guns in effectiveness. As this gun weighs but 359 kg. (791.2 lbs.) it might be lengthened and its living force be further in-

creased, but it can scarcely be believed that its maker would undertake to satisfy the programme of the German writer.

It is well known that, without explaining himself on the matter of pressure, the author has made up his mind, in the course of his polemics, that he would have to wait to exceed the values now in use; and it is certain that a maximum pressure of 2200 kg. (4850.2 lbs.) must seem to him very small. But on the one hand it has been shown against what excess he is about to bring up, and on the other it has just been seen that, while granting to his projectile a rather less travel, the projected gun is much less powerful than similar good guns now in existence. To answer such objections by a promise of a revolution in the making of powder or of gun metal is not calculated to insure their being soon removed.

The general disclaims having thought in his project of the Krupp 8.4c. (3.31 in.) gun. That does not invalidate in any way the value of the comparison, and authorizes the seeking of how he was led to propose such audacious data.

40.—In the matter of the weight and length of the gun the author started with the German heavy field piece, the weight of which is 450 kg. (992 lbs.). Reduced to the 7c. (2.76 in.) calibre it would only weigh 320 kg. (705.4 lbs.); but giving it 400 (881.8 lbs.), there is reserved, he says, 80 kg. for lengthening and for strengthening its thickness "at the most threatened points."

Here is a regular sophism. Reduced to 7c. (2.76 in.) calibre, the piece should only measure 1.67 m. (65.75 in.) in length; if it be given 2.80 m. (110.24 in.) it must no longer be compared with the German field gun; it is made a 40-calibre gun which can no longer be compared with other than 40-calibre guns; and there is found, not a surplus in weight of 80 kg. (176.4 lbs.), but, what is a very different thing, a shortage of 208 kg. (458.5 lbs.) or of 167 kg. (368.1 lbs.), according as it is compared with the Krupp 8.4c. (3.31 in.) gun or with the 7.5c.

The greater value is to be attached to this consideration in that the German field gun bears exactly on the objection to General Wille's project mentioned in § 32; it was not made for azotized powders, whereas the other two pieces were. Now, it is well known that the shape of the pressure-curves of the new powders makes necessary a relative strengthening of the chase; the ideal powder would require a gun cylindrical as to exterior. Hence it is not "at the most threatened points" that the thicknesses should be increased, but along the entire length, even when it has not been shown to what strains the gun would be subject, it would be doubtful, *a priori*, whether 80 kg. would be enough to reënforce it thus after its length had been increased by 1.13 m. (44.49 in.).

Then, to give the shape of the piece, a start was made with a gun of 23.8 calibre; its length was increased to 40 calibres, and thicknesses were assigned to it far below those of the latest 40 calibre guns which have been tried. This done, conditions of loading were imposed on this piece much more difficult than those of any other existing or projected piece, and resting on lack of knowledge of a fundamental piece.

41.—Up to this point the objections made to the project are, as one might say, quantitative, or special. One element having just now a maxi-

mum value laid down by practice, the project has one much greater, going from single to double; the critics object that such a degree of progress cannot be made so quickly; the author merely answers that he hopes to see it some day. It can only be concluded that such far away hopes, very much akin to despair, cannot be entertained in the matter of preparations for war, and that other projects must be studied which may be carried through by men now living.

But in what concerns the sectional density of the projectile, or, what amounts to the same thing, the determination of the calibre, a grave mistake, foreshadowed in § 23, has been made, and it forms unfortunately the very starting point of the system. This error did not escape the *Deutsche Heeres-Zeitung*, which alludes to it very distinctly, without setting forth the law which is violated; and it is worthy of notice that, of the three German journals which published important criticisms of the system, the author only answered the other two.

It is known that the project starts with the weight of 6.5 kg. (14.3 lbs.), assumed, rightly or wrongly, as proper for the field projectile; that granted, here is how the calibre is determined.

"As, in my opinion, the field-gun of the future should fire with a *very great* initial velocity, we cannot dispense with giving it also a *very great* sectional density. The field projectiles which are best provided in this respect are those of the 20 pdr. English and 95 mm. (3.7 in.) French, which, indeed, no longer have a place in the field outfit, but which may eventually become a part thereof. The projectiles of the first weigh 10 kg. (22 lbs.) or 160. g. per cm.^{2}; those of the second, on an average, 11.4 kg. (25.1 lbs.), or 160.8 g. per cm.^{2} By selecting *a slightly greater* value, *included between 160 and 170 g.*, all the exigencies which may arise from the velocity, however great it be, imparted to a field projectile, will be met." And it is needless to add that *between* these two extreme values of 160 and 170, the greatest has been chosen.

Granted, that such a density meets the exigencies relating to the conservation of the velocity; but that it is compatible with the strength of a gun firing heavy charges is another matter.

The defect in the reasoning which has just been reproduced is evident; its author seems to believe that if the projectiles of the 95 mm. gun have a given weight, per cm^2 of section, it is because they are fired with a very high velocity. As a matter of fact the velocity of the ordinary shell is 443 m. (1391.9 f. s.) that of the grape shell is only 418 m. (1301.3 f. s.) and if they have great sectional density it is merely because they are of heavy calibre.

If it be desired to be able to compare guns of different calibres, they must be similar and similarly loaded; the dimensions of the projectile, like those of the grains of powder, should vary with the calibre, weights with its cube. All else equal, the sectional density of a projectile is proportionate to its length, that is to the calibre; to consider its absolute value is to invite strange consequences. This will be seen by the following examples.

If it be assumed that the density 160.8 g. is suited to a 95 mm. (3.7 in.) projectile, the 7 c. (2.76 in.) one should have a density of 118.5 g., which corresponds to a weight of only 4.880 kg. (10.73 lbs.).

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To give it the density of 170 g. would amount to giving a 95 mm. (3.7 in.) projectile a weight of 16.4 kg. (36.08 lbs.); on the other hand the charge of 1500 g. of the *Cannon of the future*, increased in proportion to the cube of the calibre, would be equal to 3.750 kg. (8.25 lbs.) of Nobel powder, nearly equal to double that weight of black powder; with regard to the 95 mm. (3.7 in.) gun, these conditions of loading amount to increasing the weight of the projectile 50 per cent., and of the charge more than 250 per cent.

42.—Probing the matter to the bottom, it is seen that the confusion wrought here may be imputed to the abuse which one is often tempted to make of sectional densities. This idea is quite well suited to the comparison of projectiles of like calibre; but as the sectional density is itself a function of the calibre, it should not be brought into the question when projectiles of different calibres are compared.

It is also found to be much preferable to preserve the old, wholly general method, which consists in referring the weight of a projectile to that of the solid round shot of the same calibre; in this way there is always at hand a standard applicable to every case, because the influences of calibre and internal arrangement are eliminated. Reviewing in this way the examples given above, there is no risk of yielding to the temptation of increasing by a few grammes the sectional density of a projectile one calibre larger. Thus the 95 mm. (3.7 in.) solid shot would weigh 3.142 kg. (6.9 lbs.); hence a projectile of 11.4 kg. (25.08 lbs.) is 3.6 times as heavy; the 7 c. solid shot would weigh 1.257 kg. (2.76 lbs.) or 5.16 times less than the Wille projectile. So far as is known the density of the Gruson 7.5 c. (2.95 in.) shell, which weighs 7 kg. (15.4 lbs.) or 4.5 times the weight of the solid shot, has not been exceeded; but this projectile is fired with a velocity of 500 m. (1640. f. s.) and not of 800 metres (2624 f. s.).

43.—Let this discussion be summed up, by freeing it from the numerical examples which are useful but cumbersome.

From the beginning of his book, General Wille rises against Mr. Bender's special pleading in favor of an increase in the living force of the projectile; in his opinion it is not the living force but the remaining velocity which is important on the field of battle, and in this he is undoubtedly right. But on this point he stops at good intentions: as he increases the initial velocity greatly, while reducing the weight of the projectile but little, he brings up with a living force of 212,000 kgm. (684.559 ft. tons), against 70,000 kgm. (226.034 ft. tons) given by the present German gun. It is impossible not to call that an increase of living force.

Now the maximum pressure which a gun can stand is determined by the condition of metallurgic industry. In its turn it determines the mean pressure P given by the formula in § 30, because, for a given powder and in two similar guns (that is of the same length in calibres) these two pressures are practically proportional to each other. If then, without exceeding (as the general does) the value allowed for P, it be desired to increase the living force, that is ϕV^2 a mere inspection of the formula shows that it must be increased in the same proportion as the product wu, and since u is given by conditions of service, w should increase as the living force, that is to say,

the calibre, instead of decreasing, should increase as the square root of the living force.

Such, in conclusion, is the fundamental error of the project. The weight of 400 kg. (880 lbs.) is perfectly suitable for a field gun; 6.5 kg. (14.3 lbs.) will do for the projectile; what cannot be hoped for is that a gun *of this weight* should give a projectile *of this weight* a velocity of 800 m. (2624 f. s.) "at least," nor, moreover, that the calibre of this projectile can be reduced to 7c. (2.76 in.)

It has just been shown that this reduction is incompatible with the strength of the gun; it will be seen further on that it cannot even be a question, now, of making a projectile which combines with this calibre so high a weight.

Military Notes.

CONTINENTAL METHODS OF ATTACK.

AN instructive comparison of the most important regulations of four Continental Powers as regards the attack is given in the September and October numbers 1892 of the *Proceedings* of the Royal Artillery Institution. It is a translation by Colonel Lonsdale Hale, late Royal Engineers, from the *Militär Wochenblatt*, and shortly describes the different methods of attack adopted in Germany, Russia, Austria, and France.

The German regulations make a distinction between the "*Begegnungsgefecht*" (improvised fight) and that on a prepared position; in the latter case the attack being in conformity with a prearranged plan, and preceded by a deployment; in the former case the fight is developed from the march, the deployment of the main body being effected under the protection of the advanced guard.

The attack is divided into three parts: 1. Troops are thrown forward to open fire on the enemy as near to his position as the ground allows. 2. Strong swarms of shooters work their way up to these troops and endeavor to conquer the enemy by fire. The only prospect of success lies in obtaining this superiority of fire. 3. When this superiority is attained, the shooting line, aided by supporting troops arrived close at hand, advance to storm the position. This order will, as a rule, come from the highest commander, but the impulse (*Anstoss*) for the attack may also proceed from the shooting line.

The retreating enemy is pursued with fire after the capture of his position. An enveloping attack is recommended as conducive to success; but this is not to proceed from the developed fighting line, but must be arranged for beforehand.

The Russians divide the attack into—1. Advance. 2. Attack.

From the deployment (*Entwicklung der Gefechtsordnung*)—about 2000 paces from the enemy—to the entry within the zone of strong hostile rifle fire—800 paces from the enemy—the advance is continued along the whole front in quick time. From this point the attack is the object of all forward movements. The command has ascertained the position of the enemy, arranged the plan of attack, strengthened the shooting line, and given to all the troops the right direction in which to attack.

The advance is by rushes either of the whole line or by portions of the same. The last firing position from which the attack is prepared by fire is from 300-150 paces from the enemy. From this point the attack is with

the bayonet. Reserves advance over open ground in line within open files. When the shooting line is in its last position (300-150) the reserves may not be further than 200 paces in rear of it. The reinforcement of the shooting line is carried out before advancing to the attack at 800 paces from the enemy.

In Austria the superior commander draws up a plan of combat. The offensive must always be taken. If possible the attack must be enveloping, and only frontal when a surprise or approach under cover is possible, or if any other direction for the attack is not available. Under the protection of a preparatory fight follows the development of the main body next to the advancing line; later on the main body is pushed forward to those points from which the attack proper will commence, and at the decisive advance moves directly forward. The principle is to arrive quickly as near as possible to the enemy. At long rifle range, 2000-1000 paces, the advance is by the whole line. At medium ranges, 1000-500 paces, simultaneous rushes by whole companies; from 500 paces is carried out the decisive attack, after previous shattering of the enemy by fire. There must be a constant pressing forward everywhere. The order for the attack will, as a rule, come from the supreme commander (*Signal-Storm*), but the impulse for it may be given from the shooting line. At the moment before the decisive attack is made (*beim Abbruch des Gefechts vor der Entscheidung*) the reserves are to be sent back to take up on the flank a rallying position, but only there where obstinate resistances is intended.

The French views on the subject are as follows: The attack alone can obtain decisive results. Formations for the advance are to be chosen suited to the ground, and screened from the enemy's view. No premature deployment; only when the enemy's fire renders it necessary will a shooting line be extended, sufficing for the opening of the fight. If the hostile fire is opened, fire will be opened in reply at 700 metres, otherwise as near the enemy as possible. The further advance follows from position to position, the intermixture of commands being avoided; the supports come up on the flanks and in the intervals. The supports gradually near the shooting line. As soon as fire reinforcements are necessary half-sections or sections are sent forward in the intervals or on the flanks. This insertion of reinforcements gives the impulse to a further advance. When the advance has arrived at 400 metres, the action is carried on with the aid of the reserves, the advance being by 50 metre rushes of companies or in echelon. Those shooters left in rear may not fire if there is not interval available. At 250-200 metres bayonets are fixed. The shooters increase the fire and direct it on to the point to be assaulted. The advance of the reserve to the assault is the signal for the storming, if the enemy has not yet given way. To the "storm pace" soon succeeds the "double;" with the cry *En avant à la baïonnette* all throw themselves on the enemy. This is conducted with the greatest energy. The pursuit is carried on by fire. In case of failure of the attack, company leaders rally their companies quickly and endeavor to renew the attack, for the advance is always preferable to the destructive retreat.

In making a comparison the writer observes that in all four the attack is

in three parts. The Russian primary division is of two, but the attack portion subsequently becomes two, making three. The first is the advance towards the position up to the opening of fire. The second is the carrying through the fire fight and advance up to the storming. The third is the bayonet attack.

The four systems agree that the first stage is to be carried out with weak advanced troops; the extended shooters going forward in one body quickly as near to the enemy as possible. The Germans do not give any distance to which the first advance should be made, nor where it commences. The Russians and Austrians give 2000 paces as the commencement. The French make the formation of a shooting line dependent on the enemy's fire. The Russians consider up to 800 paces, the Austrians 1000 paces, the French 700 metres (900 paces) as the distance from the enemy to be attained by the first general advance. For the fire fight the Germans give strong swarms of shooters working their way marching or by rushes, and seeking to gain superiority of fire. The Russians and Austrians order rushes, the former to 300-150 paces, the latter to 500 paces, the former with the whole or parts of the shooting line, the latter by whole companies. The French by rushes, company or echelon up to 50 metres from the enemy; no mixing up. The Russians reinforce the shooting line at 800 paces before the commencement of the attack. The French accept 400 metres as the distance for the entry of the supports. The Germans and Austrians are silent on the subject. All four demand the shattering of the enemy by fire before the commencement of the storming.

All four have the advance to the storm carried out by the shooting line aided by the reserves. The Germans bring their reserves for the purpose close up. The Russians at most 200 paces from the shooters. With the Russians the bayonet attack commences from the last firing position, 300-150 paces; the French 250-200 metres from the enemy; the Austrians say the attack proper commences at 500 paces; the Germans give no distance. Both Germans and Austrians leave the order for the decisive assault to the highest leader, or through impulses from the shooting line. The Russian and French are silent on the matter. All four pursue the enemy with fire; the French provides for a renewal of a failed attack. It is to be noted that the German regulations order the deployment before the fight; whilst the Austrian regulations order the development of the main body, and, later on, its movement to those points from which the attack proper is to commence. —*United Service Gazette.*

THE SOUCHIER PRISM-TELEMETER.

(From the Revue du Cercle Militaire, by Lieut. J. C. Bush.)

This pocket range-finder has been recently adopted in the Russian service for infantry and artillery and is the invention of Captain Souchier of the French Army, instructor at the firing school.

The instrument consists of a pentagonal prism of glass inclosed in a celluloid case.

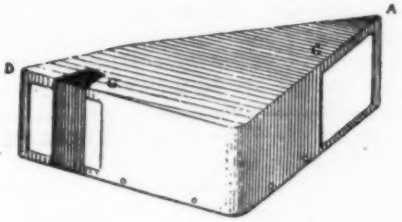

Fig. 1.

The five vertical faces include the following angles:

A=67°, 30′.
B=90°.
C=177°, 50′.
D=69°, 40′.
E=135°.

The prism has a height of about 0.4 of an inch, and the protecting case leaves the portions AG and DG′ uncovered (Fig. 1).

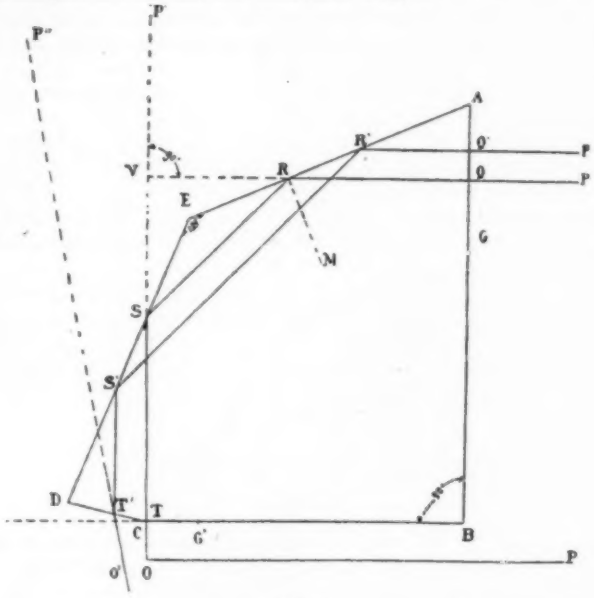

FIG. 2.

If we turn the face AB (Fig. 2) towards an object P, the incident rays, such as PR, which we may consider perpendicular to the face AB, enter the prism without deviation, meet the face AE making with the normal at the point of incidence an angle greater than the critical angle for glass. They

are therefore totally reflected on this face and again on the face ED which they meet under the same conditions. The angle AED being 135°, the ray after total reflection on each of the faces AE, ED, takes a direction perpendicular to that of its incidence PR and leaves the prism normally to the face BC, and consequently, without refraction.

Such incident rays as PR′, which we may consider as parallel to PR on account of the distance of the object, meet the face DC after double reflection on the faces AE, ED. The inclination of the face DC with regard to the doubly reflected rays causes them to be deviated from the normal to this face at the point of emergence T′. The eye placed at O′ sees an image of the point P at P″ in such a direction that the angle P″O′P is equal to a right-angle plus the angle of deviation ST′P″. This last angle is by the construction of the prism, kept at about 1°, 05′. The operator can thus, according as he places his eye at O or O′, construct on the lines PR′ or PR an angle of 90° or one of 90°+1°, 05′.

There is a position for the eye intermediate between O and O′, which permits the reflected image P′ and the reflected and refracted image P″ to be seen at the same time; the angle thus formed is evidently 1°, 05′. The operator can turn either the face AB or the faces DC, CB towards the object. In the first case, the deviation due to refraction is produced by the reflected ray and in the second case by the incident ray, but the result remains the same.

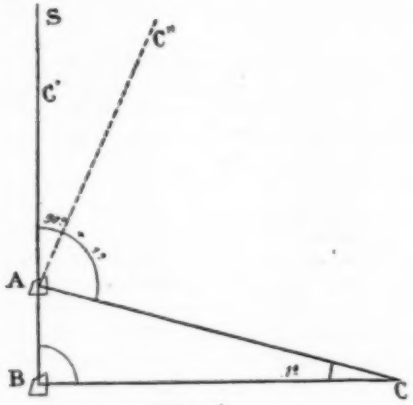

Fig 4

This granted, let AC (Fig. 4) represent a distance which we desire to measure. The operator placed at A constructs the angle CAS of 90+1°, 05′ by marking with a signal S, the direction AC′ in which he sees the left-hand image of the point C. He then moves back along the line AS to some point B where the right-hand image C″ of the point C coincides with the signal S. The angle CBS is 90°.

The angle at C is equal to the difference between the angles SAC and SBC, that is to 1°,05′. Now the sine of the angle 1°,05′ is sensibly equal to

1/50; and in the triangle ABC, we have $AC = \frac{AB}{\text{sine } C} = 50 \times AB$. We have

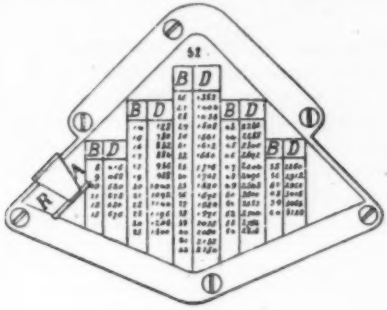

FIG. 5.

simply to measure the base AB and multiply it by 50 to determine the distance AC sought. Generally the sine of the angle formed by the two images is not exactly 1/50 on account of difficulties in the construction of the instrument. We must then multiply the base by some other number than 50. In order to avoid this multiplication, the maker has placed upon the back of each instrument a table which gives in metres the distances corresponding to each base ordinarily occurring in practice. The table is arranged in two columns of B, bases, and D, distances. Distances corresponding to bases outside the limits of the table, either way, are obtained by multiplication or division. Thus the distance corresponding to 10 metres is half of that for 20 metres, and the one for 80 metres is twice that for 40.

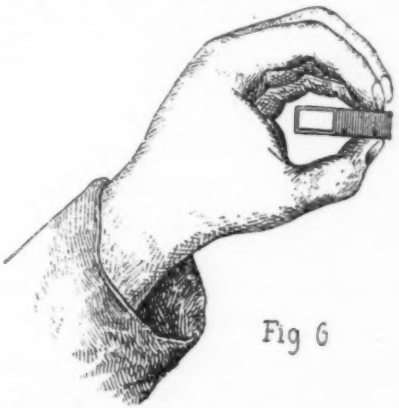

Fig 6

The instrument is usually held in the left hand between the thumb and first three fingers, the fingers being bent so that the operator can see under them. The base may be measured towards the signal S or away from it by

moving certain slides which cut off the rays corresponding to 90° or 90+ 1°,05′ depending on which angle is used first. The distant object is in this case on the right hand and is always perpendicular in direction to the base measured.

Should the ground prove impracticable for measuring in the above direction, then by taking the instrument in the right hand, facing about so as to bring the object on the left hand, and turning the instrument round so as to bring the side AB to the eye, the operator can measure the base in the opposite direction.

The mean error is given as about 25 metres per thousand metres.

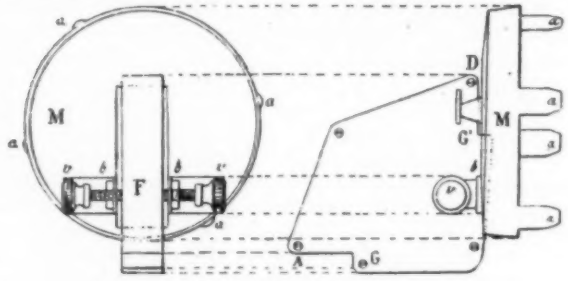

Fig. 8.

Captain Eroguine of the Russian Service has added to the telemeter an attachment of his own invention by which the instrument can be applied to a field-glass.

This attachment consists of a cap M which is placed over one of the object glasses of the field-glass and is kept in place by the elasticity of four clips (a).

A horizontal opening is cut in the lower part of this cap into which the telemeter fits either on the side DG′ or AG. Two projections (b) on this cap, each carrying a screw (v), hold the range-finder in place. The opening F is wider than the thickness of the prism and the resulting aperture permits the object to be seen outside the instrument. By tightening one screw and loosening the other this aperture may be made at either the upper or lower base of the telemeter.

From experiments made at the firing school it was shown, that by using the field-glass distances of from 5000 to 8000 metres could be measured, thus rendering the range-finder suitable for artillery purposes. At a distance of 2000 or 3000 metres this combination gave a precision twice as great as when the prism was used alone and the time taken was but little longer.

THE NEW GERMAN FIELD ARTILLERY.

The new German artillery is said to be the most terrible war instrument ever produced. During the Franco-German War it was considered effective shooting if splinters from a shell were thrown within a circuit of 40 or

*A full discussion of this range-finder will be found in the *Revue D'Artillerie*, January Number, 1893.

50 paces and seldom more than seven or eight men were wounded. The new weapon has much greater destructive power. Experiments made deeply impressed the experts, the Kaiser being present. The first shot, fired at a target placed 50 paces from a wood, missed the target, but ploughed its way way through the wood for 1500 ft. Soon after a large area of the wood was seen to be ablaze. The shell was charged with a powder, the composition of which is the secret of the German Government. The splinters of a shell burst by the new powder cover a circle of 900 ft. A shell fired at an enormous target, constructed by the Emperor's orders, covered it with thousands of holes. A battery of the new artillery would, it is asserted, annihilate an entire division, once the range was found. The barrel of the new guns is made of cast-steel. The calibre is eight centimetres, and the total weight of the gun, limber, and carriage is slightly less than at present. The mobility of the field artillery will thus be increased enormously. The new arm is loaded and fired in one-third of the time required in working the old gun, and the effect and precision are almost double. The carriage and limber is of iron and ironplate. The carriage is supplied with a brake, which counteracts the recoil, the process of loading and firing being thus materially simplified. The limber-box is open behind near the gun when in action. The advantage of this innovation is that the projectiles can be served out from the limber and ammunition wagon with greater rapidity. Another important feature is the ammunition. Like the rifle cartridges, it consists of one piece. Ignition is produced by a "ready fuse," and the four kinds of projectiles at present in use—shell, explosive shell, shrapnel and grape shot—give place to a uniform projectile, which possesses the combined characteristics of shell and shrapnel. Explosive shell alone is used. Thus the possibility of a gunner mistaking one projectile for another in the heat of battle is averted, while the loading, aiming, and firing, besides being quicker, is surer and unattended by danger. In short, the new German field-gun is simply an enlarged rifle.—*Army and Navy Gazette.*

PATENT-SPECIFICATION MARGA AMMUNITION.*

Ammunition.—M. Marga, Brussels, Belgium.

Cartridges.—The bullet is cylindrical for part of its length and is conical at each end, its nose being ogival. The rear conical part rests on an inner tube of the cartridge-case to divide the powder charge. This arrangement allows the small central part of the powder charge to propel the bullet some distance down the barrel before the rest of the charge is burned. Various methods of attaching the inner tube to the base of the main case are described.—*United Service Gazette.*

* See JOURNAL No. 61, p. 194.

Reviews and Exchanges.

The Campaign of Waterloo. *

CONCERNING the Campaign of Waterloo there are perhaps one or two points about which there is no controversy, as for instance, the place where the battle was fought, and, approximately, the time.

It is admitted that Napoleon was in the vicinity, but it has been claimed that he was incapacitated for actual command by a crisis in the disease of which he died.

Though Wellington has the credit, George IV. more than once asserted, that he (George IV.) was present at the fight and gained the victory, and even appealed to the Duke for a confirmation of his statement, who answered:—"I have heard your Majesty say so before," rather implying that on this occasion the King was neither original nor trustworthy.

After some six thousand years of effort in every possible direction on the part of mankind, it is unreasonable to expect that any one shall lead us into untrodden regions of imagination, or even of history, but in the volume under notice Mr. Ropes has told the Story of Waterloo over again and with ample reason for the telling in the abundance of illustration and comment furnished from both old and new material.

In the matter of form, the book is most complete. There are fourteen maps and plans, giving the fullest graphical detail of the various positions and movements, there is a table of contents of thirty-two pages, a catalogue of works consulted and relating to the subject of twenty pages, and the chapters are followed by notes containing such additions and explanations as might, if incorporated with the narrative, interfere with its unity and clearness.

Among the questions, all very thoroughly and ably considered, is that of Napoleon's plan of attack which, it is maintained, involved, not the simple separation of the allied armies by any seizure of their line of communications, but an actual avoidance of this method as calculated prematurely to alarm Blucher, who was to be enveloped and crushed before any assistance could be extended by Wellington.

As part of this operation "he (Napoleon) thought that his adversary's getting thirty or forty thousand men together and either assisting the Prussians or attacking his left flank, was a thing so likely to occur, and so dangerous a thing if it did occur, that he gave his two largest corps to his best fighting general in order to provide fully for this possibility by seizing and occupying the cross-roads of Quatre-Bras." And this included Ney's being "able to spare a part of his force to take the Prussians in rear, while they were fighting at Ligny." This was the work cut out for his subordinate by Napoleon and badly done through the hesitation and unwillingness of Ney to operate with energy independent of the Emperor whose connection and support he seemed reluctant to lose.

The gathering point for the English and Belgians Wellington first established at

* *The Campaign of Waterloo, a Military History.* By John Codman Ropes. New York: Charles Scribner's Sons. 1892.

Nivelles. That Quatre-Bras was occupied on the morning and night of the 15th of June was not only without orders from Wellington, but contrary to his orders. It was effected by Prince Bernhard whose brigade occupied the line Genappe-Frasnes, to which Quatre-Bras was the centre, and the subsequent action of the Chief of Staff to the Prince of Orange.

As before said, the object of Napoleon was to completely dispose of so much of Blucher's forces as he could reach, while Ney held off whatever aid Wellington might have accumulated near Quatre-Bras, and then to turn upon Wellington in like manner, deprived as the latter would be of any help from the Prussians.

That Ney was very slow in getting his troops in hand is apparent, whereby it resulted, that notwithstanding a like dilatory conduct on the part of Wellington, Ney failed to occupy Quatre-Bras, which more push on his part would have enabled him to do. Out of forty-three thousand men within his control, less than twenty thousand were engaged.

It is true that the "superserviceable staff-officer" appears here, as he sometimes did in our own time, and the 1st Corps, turned off its proper route, oscillated uselessly between Quatre-Bras, where it did nothing, and Saint Amand, where it did a great deal of harm, but d'Erlon was nearly three hours behind time and more vigor in his advance would have carried him out of reach of misdirection.

The subject is very thoroughly treated in page 187 *et seq.* but there is not here the room for it that it deserves.

The responsibility for the delay up to noon of the 17th belongs entirely to Napoleon. He was not the man of Rivoli but the exposure and fatigue that twenty-three years readily endure is a different thing at twice that age, especially when the interval has been filled as were these last twenty-three years for the Emperor. It included victory and defeat such as have fallen to the lot of no other. After Ligny he "yielded to that lassitude which is so apt to succeed unusual exertion."

That the contingency of the Prussian retreat upon Wavre was actually present to Napoleon's mind is plainly established by the Bertrand letter to Grouchy where the Emperor says: "It is important to penetrate what the enemy is intending to do; whether they are separating themselves from the English or whether they are intending still to unite to cover Brussels or Liege in trying the fate of another battle." For the discovery of a Prussian column had been reported to the Emperor, and Grouchy was warned accordingly.

The unity and energy of action of the Prussians, when the retreat upon Wavre had been determined upon, were well worthy of praise, due to the persistency and tenacity of Blucher, who moreover was in his seventy-second year, whose horse had been killed under him the day before and he himself severely bruised and shaken up in a charge upon the French.

The pluck of the old man was wonderful. There is a curious story about him in Earl Stanhope's "Notes of Conversations with the Duke of Wellington." The Marshal, like other cavalry officers, got a fall from his horse and a blow on the head at Paris and went mad for a time. Of him the Duke says, "he knew nothing of plans of campaign but well understood a battle,"—at all events he was certain of one thing —that it was his business to fight as often as he could get a chance.

The possibility of reinforcement by Grouchy over the bridges on the Dyle at Moustier and below, as early as four P. M. of the day of Waterloo, seems clearly established and notice is taken of the recent contribution in General Marbot's Memoirs to the truth of this view. Marbot was detached to the French right and directed to push forward his outposts as far as the Dyle, "so that when Grouchy arrived the news might be passed along without delay."

XUM

But the Marshal failed to coöperate effectually with Napoleon or to comprehend intelligently the orders under which he acted and the essential object to be secured.

He appeared to be possessed with the idea that no stand would be made by the Allies short of Brussels and was content to tail after the Prussian column with no provision for keeping in touch with Napoleon or attempt to get between him and Blucher.

To march to the sound of the enemy's cannon is sometimes to blunder. It took d'Erlon away from his duty at Quatre-Bras as Grouchy knew, and able only to follow precedents rather than appreciate differences, he listened to the guns of Waterloo which told him the English were there ready and waiting for the Prussians through Wavre, and still allowed himself to be amused by a rear guard while the main body hastened to join Wellington.

The Bertrand order, conclusive as to the scope of Napoleon's outlook upon Blucher's retreat as well as his instructions to Grouchy, "first saw the light in 1842, twenty-seven years after its issue." It has now to be reckoned with in any study of the campaign. Perhaps there are documents yet to be discovered that will have as important a bearing upon some events in our Civil War. The "Rebellion Record" is not yet complete, and it is quite likely the most interesting part of it will be—the appendix.

That a general "having a distinct recollection of sending his subordinate an order, and a very distinct recollection of what he expected his subordinate to do under that order, afterwards fuses the two things in his mind and gives the order in terms of his expectations," is an experience that our war has proved to be very natural and is "certainly to be distinguished from deliberate misrepresentation."

But this, though it may reasonably explain some discrepancies in statements of Napoleon made years later at St. Helena, cannot account for the persistent assertion by Grouchy that no order or instructions except those contained in the ten A. M. and the one P. M. dispatches of the 18th were ever sent him.

Mention is made of the striking difference between Napoleon and Wellington in their ways of dealing with their subordinates, and the same opposing schools exist to-day. "Napoleon expected from his high officers a sort of coöperation." He had been "for years constantly in the habit of directing complicated movements in which the active and intelligent comprehension of his main object and purpose on the part of his lieutenants, operating at a greater or less distance from him, was essential to success."

This is well enough so long as the master hand can be felt before it is too late to correct and amplify, but it encourages a tendency to independent scheming which has its perils, as the behavior of Napoleon's Marshals in Spain abundantly proves, where in the absence of the Emperor, it was impossible to secure any concert and unity of action.

But "in the English Army there was nothing of this sort. Obedience, not coöperation, was what Wellington required and it was all he needed," perhaps for the reason that the area of his work contained but a small part of the continent embraced by Napoleon's calculations.

Perhaps too the Imperialized French and the insular English were in danger of opposite faults and needed, the one, encouragement to take a healthy initiative, and the other, repression of his self-sufficiency. Also he who has absolute power can afford a margin impossible to a commander who is held by "Home Authority" to a rigid accountability in case of failure.

Among the Prussians there was greater freedom. "The night after the battle of Ligny after much discussion, Blucher and Grolmann carried the day for remaining in

communication with the English against Gneiseneau, who suggested falling back upon their own lines to Naumur."

In further illustration of Prussian shrewdness, mention is made of the fact that Blucher did not commit himself to a movement in force towards the English out of Wavre until he heard the first guns of Waterloo, and so knew for a verity that Wellington was engaged to fight south of the forest of Soignes.

But Grouchy put no similar soldierly interpretation upon the echoes of this artillery.

Tactical details have in most cases been purposely omitted in this book but there is a clear statement of the dispositions of the first corps. Its attack was made in four divisional columns, echeloned left in front, formed in lines of battalions with five paces between each line, and each battalion in three ranks.

In the left column were four battalions and consequently twelve successive ranks, then two columns of eight battalions each, in twenty-four ranks.

Such masses were indeed food for powder but even then, cut up at short range by musketry, artillery and cavalry, they gained the crest of the British position. Their intended supports however, the VIth Corps, were already occupied with the Prussians moving from St. Lambert upon the French flank and rear.

The final charge of the Guard was made in one column composed of some six battalions, echeloned right in front, each battalion of four companies formed in two divisions.

This column moved diagonally across the field upon the enemy's right centre and appears to have halted about twenty paces from the allied lines. There the leading battalions were overwhelmed by infantry and artillery fire.

The Guard should have been supported by cavalry which would have forced the British lines into squares and kept down their fire. But the cavalry had already been pounded to pieces in "previous repeated ineffectual and costly efforts to carry the plateau" by themselves.

This premature use of cavalry is noted as a grave fault as well as the strange failure to reduce with artillery the positions of Hugomont and La Haye Sainte which would have largely saved the French infantry, wasted in continuous onslaughts against the defenses of these outposts the cover of which placed the infantry attack under great disadvantage.

The formation and employment of the force thus directed upon the English appear to have been left immediately to Ney.

Early in the afternoon the advance of the Prussians engaged the personal attention of the Emperor. The flank, rear and communication of the French were seriously endangered and their protection became all-important. It was seven o'clock before the repulse of the Prussians seemed to be sufficiently assured to leave the Emperor free. The fight he had been conducting at Planchenoit was nearly two miles from the English lines towards which he returned too late for anything more than the last effort of such fractions of the Guard as were still disposable.

As it was, the allied lines had incurred heavy losses and were badly shaken and could Napoleon have now put in the reserves hitherto detained by and occupied with the Prussians from the beginning of the fight, it seems reasonable to suppose the beauty and chivalry of the Belgian capital might have again deployed before the Emperor as well as the Duke.

But "the van of Zieten's Corps had reached Papelotte and the division of Steinmetz, supported by cavalry and infantry, turned at once the right of the Ist Corps and the left of the VIth advanced upon the field of battle spreading terror and confusion upon the right wing of the French army * * * * and the Duke *seeing the battle was won* ordered the whole line to advance."

Among the singularities of this campaign are noted the detail of Soult for staff-duty, the very late assignment of Ney to his command and the retention of a soldier like Davoust in Paris.

But the wisest thing to do is to get the book and read it. It is comprehensive without being diffuse, impartial by just distribution of praise and blame rather than by a colorless neutrality, gives ample citation to support the statements made and both in method and content is such that it cannot fail to increase the knowledge of any reader.

Sir James Shaw Kennedy in speaking of the crisis of the battle is quoted as saying, "Ompteda's brigade was nearly annihilated."

Ompteda himself in his memoirs, recently published, tells how this was done and we give it as told.

"An aide-de-camp galloped up and called out at some distance in English, 'Fifth battalion, deploy and advance.' The Colonel (Ompteda) went out of the square to him and said also in English and in a friendly manner, 'would it not be advisable to advance in square and not form line till close to the enemy's infantry?' But when after the complete justification for the suggestion furnished by the recent event, (a previous charge of cavalry against the battalion) he received the abrupt reply, 'God damn it! My order to you is to deploy immediately,' Ompteda faced about and ordered the battalion to advance.

"The result was the battalion had to form square to beat off three cavalry attacks in one of which the square was not quite formed when the enemy was eight paces off."

Later in the day during Napoleon's last attack his infantry appeared on the ascent to the left rear of La Haye Sainte. "Lord Somerset, adjutant to the Prince of Orange, came galloping to Colonel Ompteda with orders to repel this body of infantry. The Colonel replied that it was impossible because the English cavalry hitherto in rear of his battalion had been ordered to the left wing so that the French cuirassiers whose helmets could plainly be discovered in the low ground would attack the battalion as soon as it deployed and moved from its present secure position. The adjutant rode back. Soon after the Prince appeared with General Von Alten. Alten repeated the order and Ompteda his opinion 'that in any case we ought to be supported by cavalry.' The Prince explained that the cavalry visible beyond the rising ground was Dutch. When the Prince had been finally convinced of the injustice and impossibility of his view he said in a sharp and peremptory manner with the fatal self-sufficiency of military ignorance, 'I must still repeat my order to attack in line with the bayonet and I will listen to no further arguments.' The Colonel merely replied in a loud voice, 'Well, I will,' drew his sword and contrary to his own better convictions and knowing that he led his men to a certain and useless destruction gave the order to form line. Then he said to his Lieut-Col., 'Try and save my two nephews,' and rode alone in front of his battalion.

"The little band of two hundred rapidly climbed the farther side of the hollow. There they were received with a murderous fire of musketry. Ompteda called out, 'Follow me, comrades,' and galloped into the midst of the foe, who in all arms filled the level ground between the hollow and the northern garden hedge. But the battalion could only follow its Colonel a little way, with a 'hurrah' they forced the enemy back, but the cuirassiers were already on them from the right in flank and rear. The line was doubled up, broken and cut to pieces. The Lieutenant-Colonel lay for a short time under his wounded horse. When he could rise he saw that the battalion was annihilated. Close to him stood the Colonel's two nephews, Christian and Louis. He seized both boys by the arms and sprang back into the hollow with them in spite of their struggles, so that the Colonel's last request was faithfully carried out. Around him collected six officers of the battalion and eighteen men.

"The brigade adjutant, four officers and one hundred and thirty non-commissioned officers and men remained dead or severely wounded on the blood-stained field."

The story closes with a statement of one of the captains who "saw Colonel Ompteda in the hindmost throng of the enemy's infantry and cavalry sink from his horse and vanish."

So it seems that useless waste of life through inconsiderate orders and faulty formations were not confined to the French.

And the aide-de-camp, usually improvised and more profane than practical, with a borrowed authority and an impatience entirely his own, is a familiar figure in many a military landscope.

Perhaps the veteran Colonel was too much disposed to try conclusions with his youthful superior who had rank while the Colonel had reason on his side, to say nothing of the very great satisfaction of dying to prove he was right.

H. W. C.

The Life of General Taylor.*

This volume is one of "The Great Commander Series." It may be considered the ripest of all the lives of General Taylor. Preceding ones have been written with an outside effect of some kind to be produced, but at this late day and in the hands of an eminently just and unimpassioned biografer† we should expect what we find, a treatise full of its *subject*, in love with it, but not blinded to infatuation. In fact, to one knowing the author's political sentiments, it is almost miraculous to find the burning questions of those times of secession's incubation treated with such cold firmness, but thereby probably branded with a severer condemnation than harsher frases would have effected.

The work commences with a most graceful introductory chapter named a "comprehensive view" of General Taylor's character, and with pen and ink vignettes of the hero's field of operations, as in the past and in the present, such as to bring out in proximate contrast the great debt our nation owes him. The second chapter written under high heat shows that gray hairs and an empty sleeve have not abated the fire of the author's enthusiasm.

In reference to the battle of Tippecanoe, our boyhood's remembrance is that General Harrison did *not* "bring the indians to battle on his own chosen ground," but, on the contrary, that they met him the night before in a friendly manner and showed him a good camping ground, with fine wood and water, which he accepted. It was on the bank of a creek which embraced the camp on two sides and the banks of which made an excellent epaulement for the indians who from the creek bottom attacked him before daylight. Had Taylor been with him it is more than probable that Harrison would not have accepted the ground on which we believe all his officers except Ensign, afterward General, John Tipton were killed or wounded.

Col. Taylor's services in the Black Hawk war are but slightly, yet masterfully touched upon, bringing out our hero's characteristics. It was the fortune of this reviewer to travel,—in 1834 as a little boy with ox-wagon conveyance from Saint Mary's, then the next station north of Piqua, O., to Fort Wayne, Ind.,—over this road, cut in Harrison's relief of this place. The frost had just come out of the ground and spring rains succeeded; the deep alluvium was reeking with malaria and the mud mid-spoke deep. At no time did we make more than two hundred yards without stall-

* *The Life of General Taylor.* By General O. O. Howard, U. S. Army.

†Author's preference in spelling.

ing and prying over the roots. A good travel was a mile and a half an hour. At night ox, man, woman and child were utterly exhausted. My boyish memory serves me with the following colloquy at night between a young and an old teamster (*bull-whackers* as we called them). Says the old 'un: "Wa-a-il folks, I'd ruther sodjer a ——— sight; I helpt cut this yer road in the injun war of Twelve, and that was a pic-nic compared to this; ya-a s sir, I'd ruther sodjer." "Wa-a-il," said the younger, "ef I couldn't cut a better road than this I'd been in better business at home, and let Wayne tuk care of itself." And we all sympathized in the young man's sentiments. In Thirty-four there were no houses between Saint Mary's and Fort Wayne other than those log ones about a day's drive apart, say eight to twelve miles, planted in the middle of a little 'clearing' with a well curbed with oak split slabs. No stones nor rocks within days' journeys.

The author carries us next down to Florida. In this day when open order even against a civilized enemy is so advocated, it is strange to look back to Colonel Taylor's report of the Okeechobee and see with what persistance we stuck to our double close rank formation against the indian scattered order. It is true that the Colonel surmises an equal loss of savages, founded on the fact that ten of their dead were left behind, inferring that of course many more were carried off: but the chances are that our close order gave the indians the plentiest harvest. Thro' our numbers and persistance we drove them off disorganized, for in a body they do not stand killing, as will the civilized man.

Colonel Taylor's tenderness of soul and fertility of resources in caring for the wounded are well brought out.

The writer's statement of the political questions involved in our acquisition of Texas is exceedingly and unexpectedly moderate. There was a fine opportunity here for a lover of human liberty to give the old proslavery politics, and the corresponding plans for dominance—a severe lashing: he has foreborne and wisely we think. He satisfies himself with clearing General Taylor from complicity in "the steal."

Is the author a bit ironical on page 83 when he says "President Polk at first made an effort to settle the question in dispute by negotiation, *which could easily have been done had Mexico been willing to yield the two principal points at issue, viz.: First, the right of Texas as an independent State to seek and receive admission into our Union, second; The right of Texas and hence of the United States to the region lying between the Nueces and the Rio Grande?*" Surely, just there was the involved question. The sentence says: Let me steal your territory and I will not fight you! "Slidell's instructions were to carry the boundary of Texas as far west of the Nueces as possible, and to acquire further territory from Mexico as in payment of our citizens' claims against that government, amounting to some eight millions of dollars." This showed the animus of the war—acquisition of mexican territory. The stupid mexican wouldn't negotiate.

The writer on p. 89 remarks on the drill, discipline, and social cementation of Taylor's little army at Corpus Christi which reminds us of a speech of "Frince" John Magruder. It was on a most inclement night, in the last days of December, 1851. We had finished a scout against the Coyote Indians to the Colorado Desert and returning were encamped on the Santa Isabel mountains. It rained on us continuously for ten days, and there was not a dry thing in the command except the ammunition. Here we met much needed stores sent out from San Diego, among which was a keg of commissary refreshments. Gathered around the camp-fire, backs freezing, faces burning, the "Prince," prince of conversationalists, brewed us a pot of "cracker toddy." Despite the rain and cold, at about the third passing of our tin cups we became melodious, and the "Prince," who had a fine voice, gave us:

Charge boys, Charge!
Charge boys and conquer!!
The gallant Worth then drew his sword
And crossed the Colorado!!!

When the "Prince" got the Chorus to do our duty properly, he became reminiscent and said very seriously, very slowly: "There never was nor never will be another army like that one of Taylor—all with the drill of household troops—man and beast fed like fighting cocks—the old fellows with frontier and even "Last war" records, the rest of us burning to better them—all of us known to each other—perfectly devoted to and confident in our leaders—no jealousies yet engendered—what could withstand such an army?"

It makes the blood tingle in our veins to hear the distinguished soldier of a third generation indorsing the eulogies of that lonely and inclement night on the Coast Range, forty-two years agone.

Also the defeat of Thornton, on p. 103, brings to mind that Lieut. E. K. Kane, one of the captured, told us he was saved from a lancing by a mexican squad, through using a masonic sign.

The chapters introducing and recording the battles of the 8th and 9th of May, give a very high view of General Taylor's bravery, tenacity of purpose, and reliance on his troops. The biografer credits the General with foreseeing that Ampudia would attack his base and thus try to cut him off. We do not think this possible, for two reasons; first, he would have fortified Point Isabel before leaving it had he feared such a move. He had two objectives on leaving his base, Monterey and Camargo. It is not clear by what reasoning he should leave an unprotected base and make a long line of advance into a country most forbidding by nature; yet he did so. Other writers inform us that he was informed through several sources that Ampudia was about to make this movement. Had Taylor had much prevision it would strike one that it should have been used in fortifying Point Isabel before leaving his base, thus avoiding the exposure of Fort Brown to the chances of reduction during his enforced backward march, and he was unquestionably ignorant of what artillery the enemy could bring against it. When he found himself forced to go back he did the wisest thing, to go clear back: had he stopped to meet the enemy at an intermediate point, these might have refused battle and, satisfied with harassing us, passed on to the destruction of Point Isabel.

Another thing, some new material was procurable from the base that it would have been unsafe to send forward unprotected, so that, no doubt Taylor was stronger on his return that on his regression—*Per contra* the battle grounds of Palo Alto and Resaca de la Palma (this last a misnomer, it should be the Resaca de Guerrero) were both chosen by the enemy, who thereby reaped a considerable advantage.

The author must be again jocose on p. 140, where he says that "His [Taylor's] nation, as a nation though reluctantly drawn into the struggle, was in it too deeply to retire without disaster." Mexico didn't draw us into it. Our administration and congress did, and why not say so. Retirement from it would have been disastrous only to the administration, and what might have been the fate of Texas, Deity alone could answer. Threats of seeking a british protectorate were freely used in order to carry acceptance into our Union. By our votes we placed men in power whom we knew wanted Texas in order to preserve an overbalance of slave interest representation. To have withdrawn from the struggle would have been ruinous to that claim. As we said before, all our soft words amounted to but "Give me what I want, and I won't hurt you!"

Here Taylor's high character as the true patriot and soldier loyal to his superior, is

brought out in the most striking manner. He evidently did not favor the war, but with him it was My country, right or wrong, and if he had the presidential bee in his bonnet or not, his positive refusals for candidacy until war matters should be settled, form a beautiful contrast to contemporaneous and later weaklings who put themselves at cross-purposes with their administrations in the heat of the struggle.

On page 143 we are given Taylor's strategic policy, To hold all the northern states of Mexico. This was before Scott's new route was proposed. This prefigured policy may have been what carried him forward to Àgua Nueva, after Scott and Patterson had drawn from him the best part of his command and where in the mind of Scott and the administration, policy would have required him to remain at, or rather fall back from Saltillo to Monterey.

We observe a typografic error in the Wilmot Proviso, p. 146; "voluntary" is printed for involuntary [servitude].

Referring to the charge of fork-tonguedness, p. 187, against Ampudia at the capitulation of Monterey, it strikes one as very probable that he believed in a peace policy movement as in progress at his Capital. Santa Anna certainly entered Mexico thro' our blockade with the understanding that he was a peace man. On arriving in Mexico it was long before he got at the head of affairs, and he only did so by a hearty coöperation in the prosecution of the war. Therefore it was very easy for Taylor to believe Ampudia's hint at a peace policy's prevailing at the mexican capital. Without positive knowledge that Ampudia was aware of the contrary we are not justified in charging him with deception. However, we think that Taylor's best justification for the liberal terms granted the capitulation was the just apprehension of our losses in carrying the Citadel. The General made a good trade: all of Ampudia's men that met him again didn't do him the tithe of the injury he would have suffered in taking that citadel.

Secretary Marcy had an unlimited amount of 'gall,' to reprehend a general in the field whom he was well aware he had neglected to supply with half the elements ordinarily necessary to success, and this due to his own impotence or criminal economy. We are sorry to differ from the author as to the "ability" displayed in Marcy's letter of instruction received at this time, except as to the plans of campaign. The first part of schooling Taylor in how to support his army is as weak as water, and ignorant. Ignorant in that it assumes ignorance on the part of the General and his military advisers of the commonest principles of the rules of war; on the part of men at least as well informed on these rules as himself: and again ignorance of the character of the country, its inhabitants, products, and resources. The drastic measures for supplying the army more than hinted at by Marcy in such a sparse population and meager production would have been killing the goose, goslings, golden eggs and all, and would have reacted afterward disastrously on the invaders, as clearly and ably set forth by General Taylor in his reply. The puerility consists in his pompously extending in a state paper axioms of war, as if to a school-boy. And then he always finds it necessary as on every opportunity to set forth the justness of the war to bolster up the administration. Why couldn't he manfully have written thus.—"Dear General; in confidence, the war is unpopular with congress—we must run it as cheaply as possible—live off the country if you can—and the President wishes you would—stop at no sacrifice to yourselves to make it a success." This was all the grand letter of instructions meant. The plans of campaign are all able enough, but all are to the loss of Taylor's force, and to the shearing of his power of aggression. The General's protest against the Secretary's practice of direct correspondence with his subordinates was manly and receives proper praise from the biografer.

Many differ from the writer in the judiciousness of General Taylor's advance on

Saltillo. Wool's forces could easily have been called in to Monterey without the exposure of anything american to his north and east. It is not at all apparent, with his actual enlightenment, how Taylor could hold a line from Satlillo *via* Victoria to Tampico, or to a base on the Sierra Madre, without exposing his line to penetration from his estimated 50,000 enemy's troops liable to be concentrated at San Luis Potosí and of which he had previously warned the Secretary.

The author's skill in placing before the reader the status at that time of the Administration, of Scott and of Taylor, is admirable: of meaner motives than those of the Administration it would be hard to conceive: a policy to have Scott and Taylor quarrel that they should kill each other's chances for the presidency. The two generals' native nobility and frankness prevented their falling into the trap; it *was* "the Lord's work."

The biografer, forgetful of his first corps has fallen into the popular love of the word "grape" [the missile,] as have done the past historians—grape, canister, etc., at the battle of Buena Vista. We suspect there was not a *stand of grape* nearer than Montery, possibly with the 18-pdr. General Butler too reports pouring grape and canister into their ranks. Where did he get his grape for 6- and 12-pdrs.?

An excellent, stirring popular account of the battle of Buena Vista [La Angostura,] is given us. But unfortunately all the accounts we get thereof are from american writers. One of their predicates is on a mexican army of 20,000 men, in gala day attire, and in high fettle attacking our, say 4800. Now it is easy to show that Santa Anna boasted of twenty thousand men, merely to overawe Taylor. He left San Luis with only 18,000 people all told. As in all spanish-american armies a large amount of these were women and other camp followers: two thousand would be an underestimate for these. Colonel Balbotin—quite a dispassionate writer from a professional standpoint—says that that terrible march, over the thirsty desert from San Luis and especially from Encarnacion, laid four thousand men *hors du combat*, and when we know the disastrous results of the retreat, we can believe this to be no overestimate. Now, with not even a day's rest at Agua Nueva, it is not probable that Santa Anna carried more than 12,000 men into action. Then it must be remembered that from the days preceeding Don Quixote, the best spanish blood must needs be a cavalier. In every mexican army there is a great surplusage of cavalry, which, however good in the cossack *lava*, are of little use without fire arms against infantry. As far as disabling is concerned, probably there was no American hurt that day, while in ranks, by mexican cavalry. Our dragoons were very different. They were excellently armed; they dismounted and as infantry did as good service at those short ranges as the best. If, now, we take this mexican cavalry out, as only serving for threatenings and diversions, it will not leave such an overwhelming force to Santa Anna. Then all his armament and ammunition was much inferior to ours if we except some artillery of heavier calibre, which from its want of mobility had its usefulness on that heavy field much discounted. And last, General Taylor had his choice of ground. To be sure this did not prevent his left being turned through the preponderance of the enemy in members. This was just the time when the escort that accompanied him to the rear to fortify Saltillo might have prevented that left wing from being outflanked. Taylor appeared to have a genius for rushing forward and a fatality to be driven back to fortify his bases at the most critical moments. But we beat them, making all allowances, one to two.

We do not see clearly why Taylor brought on this action. It appears to have been unexpected. Had he expected to engage a large mexican force, he would not have left Saltillo unfortified and open to the raids to his rear till battle was forced upon him necessitating thus the reduction of his very small command at the risk of disaster to the whole. No question about it, Wool, a magnificent soldier reported truly to him

"We are whipt." Taylor's pluck, dogged perserverance, the *élan* his return gave to the fought-out men, and especially the new but much fatigued escort he brought back to the field, secured, with the help of an all-wise Providence, a triumfant defense, nothing more. When we remember his holding an estimate of 50,000 men, before the administration, as possible at San Luis, it is over strange that he should have advanced so unprepared. As a general advance it was a defeat.

Let us suppose Taylor had been defeated, we have yet to find any good reason to justify the exposure.

The grand results of that battle were the incidentals. Santa Anna was defeated in his well-conceived plans to crush Taylor and Scott in detail. His repulse was followed by the most appaling disorganization, sickness, exhaustion, and death rate. It took the fight out of the war party in the Capital. It cost him the prestige of leadership so that his efforts to organize against Scott's advance was up-hill work in which he found himself balked by factions at every turn. It may not be too much to say that Scott's success was due to the battle of Buena Vista. So all honor to the memory of "Old Rough and Ready," whatever were his violations of strategic rules or of those of grand tactics, 'he got there all the same.'

The book sets forth deservedly all the beauties and statesmanship of President Taylor's first message and administration, and despite the odd pleonasm of the message's introductory paragraf (not quoted by the author) it appears at this date to have been one of the ablest and most profetic documents of our history. He is credited through his firmness and patriotism with having staved off secession for eleven years—thus probably having saved the Union; for in "Sixty-one" the North was much riper for unity against slave interest than it was in "Fifty." Free-soil sentiment had grown immensely.

Upon the whole to General Howard this has been an enthusiastic work of love. He had for his subject a hero whom he appreciated, and it is a pleasure to see one great mind bearing testimony and tribute to another. If disposed to criticise the biografer we should say he gave too small a place to Colonel Bliss, Taylor's adjutant-general. As a man of learning, statesmanship, and military capacity he was the peer of any. At that time he received the credit of the manner of the General's documents without denying to the General the matter. Taylor hadn't to consult any man as to his thinking.

The book is written in vigorous english, and contains about all, we suspect, that can be known of General Taylor. The printing is well done by the Appleton company and well engraved maps sufficiently illustrate the text. The frontispiece is an excellent likeness of General Zachary Taylor. Peace to his soul! and reverence to his memory!!

J. H.

Military Government and Martial Law.*

This volume, from the publishing house of James J. Chapman, Washington, D. C., is one of the most instructive and valuable to the army officer of any which have appeared in the last few years.

It codifies and brings into condensed form, for easy reference, the principles underlying the subject and the controlling decisions, and shows patient research and mature consideration.

Among the subjects discussed separately in successive chapters are: "Power to declare War; right to Establish Military Government; temporary allegiance of inhabitants; territorial extent; territory militarily occupied: effect of occupation on local

**Military Government and Martial Law.* By William E. Birkhimer, LL. B., 1st Lieutenant and Adjutant 3d U. S. Artillery. James J. Chapman, Washington, D. C. 1892.

administration ; agents for carrying into execution ; status of inhabitants ; laws obligatory within occupied territory ; rights regarding private property and public property ; trade ; insurrection against military government and responsibility of commanders ; military tribunal and when military government ceases."

All these are subjects with which every army officer should be familiar because no one can tell when an emergency may arise when the principles here discussed may have to be applied.

The author, in the second part of his instructive book, discusses the principles contained in the foregoing headings with reference to martial law in the United States —the theory on which it is based, and English decisions ; the necessity for its administration ; Congressional martial law ; martial law in States and Territories and the responsibility of subordinates, and also bills of indemnity.

Within the past thirty-three years, the great War of the Rebellion and subsequent local insurrections have made it necessary to apply the laws of war to certain portions of the United States and its territories. Acts growing out of such a condition of affairs have necessarily become the subject of judicial determination, either in military tribunals acting under the laws of war, or in the Civil Courts of Record of original and appellate jurisdiction.

Thus have been formulated a series of discussion and precedents, which, like the development of the Common Law, have become of the greatest value in determining rules of action.

The author, while conscientiously stating decisions of apparently controlling force, has not hesitated, occasionally, in a logical and straightforward manner, to criticise where the conclusions were capable of criticism, and this is not the least valuable part of his work as these criticisms may hereafter be accepted.

During the eight years' War of the Revolution for American Independence, with invading armies on the soil of the United States, and many citizens in armed hostility either in organized tory battalions or as guerillas, martial law was applied in innumerable instances, but it is to the glory of the American Army, that the Code, as administrated was, in no known instance, an instrument of injustice or oppression.

Major John André, Adjutant General of the British army in North America, was executed as a spy, sentence of a Board of General officers sitting as a Military Commission, which was a tribunal unknown to the Rules and Articles of War for the Government of the American armies.

General Washington, however, recognized that the law of nations form part of the law of every civilized country, and that the laws of war or martial law, constitute that part of the law of nations which are applicable to belligerent operations on land.

After the Revolution came a long period of peace, disturbed only by frontier Indian hostilities, until the War with Great Britain in 1812. In this war military occupation was so transient that the application of the laws of war were but temporary, and gave no special occasion for consideration of questions not elementary.

The military occupation of Michigan in 1812, after Brigadier General William Hull's capitulation, enabled the Commander General of the British forces to issue a proclamation, and the occupation of Castine, Maine, by the enemy, subsequently received the attention of the Supreme Court of the United States as to the status of the inhabitants in the occupied territory. Practically, however, there was no special consideration given in the courts of the United States to the question of the nature, scope and jurisdiction of the military authorities under the laws of war until after the Mexican War.

When that contest began and Brigadier-General Zachary Taylor eventually crossed the Rio Grande into Mexico he found that the Rules and Articles of War, for the gov-

ernment of the armies of the United States did not provide for many contingencies in the changed situation, nor did they cover cases for example, where his soldiers were assassinated by Mexicans.

The General-in-Chief, Winfield Scott, was, however, both a lawyer and a soldier, and had studied the laws of war, and upon his arrival at Tampico, issued his celebrated order on martial law, on February 19, 1847, which he amplified in General Orders from the National Palace at the City of Mexico on September 17, 1847.

It formed the basis of General Orders No. 100 of 1863, from the War Department, (A. G. O.) prepared by the late Professor Francis Lieber, which, altogether incorrect in some details as well as betraying the peculiarities of his own mind, has proven a most valuable codification.

Acts done by military commanders during the war with Mexico, subsequently became the subject of investigation in common law actions in the Courts of the United States and then was perceived the effort of common law judges to apply common law principles to conditions totally out of the common law.

This was due, probably, to the fact that English precedents were apparently relied on in which the principles of the common law had been applied in cases which had arisen on *English* territory and in which *there was no recognized belligerent.*

The unfortunate officer in the case (Harmony v. Mitchell, 1 Blatchford 549) was therefore mulcted, but it is believed that if the case had been argued in the light of the experience derived from the late War of the Rebellion and the precedents then established by tribunals under the laws of war—as to the real scope of such laws—and the exercise of military authority thereunder, the decision would have been very different.

The author has followed his excellent review of this case with references to subsequent remedial legislation and with citations from more recent decisions of the Supreme Court of the United States in which the earlier decision has been modified.

The division of his book into Part I. on "Military Government" and Part II. on "Martial Law," is conceived to be unnecessary.

The United States are governed by the law of nations as much as by the Constitution—the law of nations being the unwritten code recognized in the Constitution.

To illustrate,—an envoy extraordinary from a foreign power may deliberately kill a citizen in the District of Columbia.

This would be murder under the laws of the United States constitutionally enacted and yet, under the principle of ex-territoriality applicable to the foreign envoy under the law of nations, the local law would be unavailable and he could only be dismissed for trial by his own sovereignty.

In like manner—martial law is that part of the law of nations applicable to *belligerent* operations on land—and it makes no difference whether the belligerent is a foreign or domestic belligerent.

In case of a domestic belligerent laws are usually enacted to determine *when* and *how* such belligerent shall be declared—usually dependent on whether the civil authority is able to subdue *armed* resistance to the civil authority.

It may be a single insurrectionary mob against whom martial law may be declared by the proper civil authority or it may be a district or territory involved in the proclamation.

In either case—the same laws of war are applied—as if the force in arms were a foreign invader—with the exception—that on a declaration of peace or of cessation of insurrection, the prisoners taken in domestic insurrection may be turned over to the civil authority to be dealt with according to law instead of being released.

Military commissions and boards are the appropriate tribunals to determine whether the laws of war have been violated.

This was illustrated in 1864–65 by a Board of United States officers to investigate and report whether the Confederate Generals Pickett and Hoke had violated the laws of war by the execution of twenty-two Union soldiers of the 2d Regiment North Carolina Volunteers taken prisoners of war at Little Washington, N. C.

Such tribunals are always composed of sworn commissioned officers and cruelty, rapine, or other crime are as much the subject of reprehension in such tribunals under the laws of war as if brought under the cognizance of the civil courts of criminal jurisdiction.

With this single dissent from an otherwise admirable work it is to be hoped that it will find its way into every officer's library.

It was a graceful act to dedicate it to the late Lieutenant Colonel Robert N. Scott, 3d Artillery, and all old officers, who knew him and knew his labors, will appreciate it.

Artillery officers have generally done their full share towards the advancement of military science and in elucidation of those subjects necessary in an officer's duties.

The book under review is a credit to the service to which the author belongs.

ASA BIRD GARDINER.

Infantry Fire; Its Use In Battle.*

It is conceded that success in battle will fall to the side that is superior in fire action at the critical moment. The subject of fire has been extensively studied in Europe, but here it has not received the consideration that its importance warrants. Lieut. Batchelor's work has in view the presentation in a condensed form of a mass of information covering the whole subject, in such form and style, as to be adapted to the use of our army. We have heretofore been concerned with the idea that we must make every soldier a good shot, losing sight of the fact that few men are individually good shots when under fire, their skill being greatly nullified by the excitement of battle and their ignorance of the true range. Uncontrolled fire is only suitable for the short ranges, and successful fire action will now depend upon the collective, controlled fire of masses, up to the very last stages of the fight. Even with the best training the control of the firing line will be lost only too soon, and our best hope will lie in the constant training of men in time of peace in doing what they will have to do in war. It is now believed that the best results can be attained by the regulated, sudden and intermittent fire of masses, rather than by the old continuous interminable fire of infantry. It is not intended to decry the importance of having trained marksmen in collective firing, but to bring out the fact that good results can be obtained with average shots under the conditions that these men are kept in hand by a particular fire discipline. Lieut. Batchelor's work is concerned with the attempt to show that the true scope of musketry instruction lies in establishing the following propositions:

1st. That variations in the rifle, the firer and external conditions cause a dispersion of shots, which may be decreased but not removed, and that therefore uncontrolled fire beyond certain ranges is not only useless but harmful.

2d. That the collective, controlled fire of masses is useful at much longer ranges, and therefore essential to the proper use of the rifle.

3d. That in order to properly direct the fire of their men, officers must study the influence of ground on the effects of fire.

4th. That the supply of ammunition in battle must be carefully provided for, and economy of ammunition rigidly enforced.

5th. That the means for restricting uncontrolled fire to its proper place, for giving

**Infantry Fire; Its Use in Battle.* By Lieut. J. B. Batchelor, Jr., 24th Inf. Geo. A. Spooner. Leavenworth, Kan.

to collective fire its proper efficacy, and for economizing ammunition, must be found in Fire Discipline, founded on the proper training of the Fire Units. The first chapters of the book are devoted to the study of the trajectory and its variations, and to the limit of individual fire. Under the latter head, the following deductions are made: That nothing can be expected beyond 800 yards when the distance is exactly known, or 400 yards when the distance is estimated, from the fire of single men, because beyond these limits the skill of the firer cannot counterbalance the unfavorable influences independent of his action. Individual fire at ranges longer than those mentioned is a mere waste of ammunition. That a sight graduated for higher ranges than 1000 yards, is a permanent source of danger for imperfectly trained troops, commanded by inexperienced officers. The later chapters treat of the important subjects of Controlled Fire and Combined Sights, Effects of Collective Fire, Influence of Ground, Supply of Ammunition, etc. When a body of men fire on a given objective using the same elevation, the shots will be found to group themselves on the ground in the form of an ellipse, having its greater axis in the direction of fire, with the hits most densely grouped in the centre.

The depth of this beaten zone is sensibly constant, whatever the distance of the objective, and considering only the best 50% of the hits, is found to be about 100 yards. This portion of the shot group is called the nucleus, and we are more especially concerned with causing some part of this nucleus to fall on the objective. A knowledge of the range to within 50 yards, is all that is absolutely required. If then the range can be found to a certain percentage of the truth, a body of men firing with the same elevation, should not fire at any range beyond that at which the given percentage of error becomes equal to half the beaten zone, or 50 yards, because the error may be either in excess or in diminution, and we cannot be sure, that any part of the beaten zone will fall on the object, if twice the error be greater than that zone, or the error greater than one-half the zone. Therefore when the range is not exactly known, to be sure of making some part of the beaten zone fall on the object, we must divide the body of men firing into two or more parts, according to the distance, and cause each part to use a different elevation at the same time, and against the same object. Although we can thus obtain our object, at the same time the intensity of the fire is correspondingly reduced. The number of sights used would depend on the probable error in estimating the distance, or the facility for observing the strike of the bullets, the nature of the objective, and on the slope of the ground.

If by training we can reduce to 0.10 the error made in estimating the distance, the following rules can be laid down for the use of combined sights:

Up to 500 yards, use one elevation. From 500 to 1000 yards, use two elevations, one 50 yards less, the other 50 yards more than the supposed distance. Beyond 1000 yards, use three elevations, one 100 yards less, one for the supposed range, and the third 100 yards more than the estimated range. Every effort should be made, however, to avoid the necessity for the use of combined sights, by using every available means to ascertain the range to within 50 yards. It is regretted that a more general discussion of the book cannot be here given. Lieut. Batchelor has treated his subject fully and thoroughly. The work is clear and comprehensive, and well worthy of careful and close study by those who would familiarize themselves with the development and theory of fire tactics.

C. L. B.

A Manual of Bacteriology.*

Within the past few years the Science of Bacteriology has advanced with rapid strides, and its importance, both in the study of Biology and in the more practical field of Pathology, has become generally recognized, and is, so far as one can see, still increasing. Every year sees more of our medical colleges equipped with laboratories for Bacteriological work, which is constantly assuming a more prominent place in practical as well as in theoretical medicine.

This volume of nearly 900 pages is a comprehensive "Manual" for teachers and physicians, which contains an extended and systematic account of the class of microörganisms to which it relates. Nearly 500 species are described in detail, including 158 species which are more or less pathogenic for man or for the lower animals.

It is also intended as a *text-book for medical students*, and a manual for laboratory work. For their convenience that portion of the work which has the greatest practical importance is printed in a larger type than is used for the detailed description of the less important pathogenic and saprophytic Bacteria.

Part First contains the Classification, Morphology, and General Bacteriological Technology, and is exceptionally complete and practical.

Part Second treats of General Biological Characters, including Structure, Motions, Reproduction, Products of Vital Activity, Ptomaines, and Toxalbumins, Antiseptics and Disinfectants, Physical and Chemical Action, etc., etc.

Part Third is devoted to Pathogenic Bacteria, and for the physician is the most important part of the volume. In it will be found a very full account of the Bacteria which have been proved to be the cause of infectious diseases in man or in the lower animals, and also of various Saprophytes which have been shown by experiment to be more or less pathogenic. This part also contains sections upon "Modes of Action," "Channels of Infection," "Susceptibility and Immunity." In these sections and in the detailed description of the pathogenic properties of specific "disease germs" an extended account is given of the investigation, mostly of recent date, relating to acquired immunity, protective inoculations, toxalbumins, antitoxines, etc.

Part Fourth gives an account of the saprophytic Bacteria, as found in the air, in water, in the soil, etc. It also contains a section which is of special value to students of Bacteriology, entitled "*Bacteriological Diagnosis.*" In this section by a systematic arrangement of morphological and biological characters, all of the Bacteria described in the volume are classified in such a manner that the student can determine whether any microörganism of this class which he encounters has previously been described. The plan is similar to that adopted in text-books of botany, except that the characters relied upon for differentiating "species" are for the most part biological rather than morphological.

The work consists of a single, splendid, royal octavo volume of 898 pages, extensively and beautifully illustrated throughout the text by numerous carefully prepared wood-engravings and "half-tone" process cuts, many of the latter being direct reproductions of photo-micrographs, and all executed and printed in an exceptional manner. Also four full-page heliotype plates from photo-micrographs of the most important pathogenic Bacteria, and four full-page chromo lithographic plates.

Price, delivered free at any address in the United States, muslin, $8.00; sheep, $9 00. William Wood & Company, New York.

**A Manual of Bacteriology.* By George M. Sternbergh, M. D., Deputy Surgeon-General U. S. Army.

Original Papers on Dynamo Machinery.*

This collection includes all written on electro-technical subjects by the distinguished author, most of which have marked eras in the advance of electrical science. Perhaps no other contributions to electrical literature since the days of Faraday have been of as an important character as those contained in the present volume, and this is true whether considered from a theoretical or from a practical standpoint.

In the first paper that invaluable aid to the study and design of dynamos, the characteristic curve, was first announced and the following three papers are devoted more or less to developing its applications.

The fourth and fifth papers, on the theory and design of continuous current dynamos, furnished the fundamental principles upon which the design of such dynamos is now based.

The sixth paper established the important principles in regard to coupling alternating current machines; the next three papers are on the transformer and the remaining two are on the Theory of the Alternate Current Dynamo and Electric light houses respectively.

The majority of the papers contain no mathematical formulæ and several others so little as not to prevent their being understood by a non-mathematical reader.

These papers with the authorization of Dr. Hopkinson, are for the first time published in a collected form and rendered accessible to the general public, and they should furnish a fruitful source of inspiration to those in search of knowledge at first hand.

Electricity and Magnetism.†

During the Philadelphia Electrical Exhibition of 1884, Prof. Houston issued a set of electrical primers for the benefit of the visitors to the exhibition, and the great popularity and wide general sale they attained showed that the public appreciated the attempt to furnish them a literature they could easily read and understand. As these primers have been out of print for some time, the author has prepared a new series but on somewhat different lines.

During the last eight years, the advances in the applications of electricity have been so great and so widespread that the public would be no longer satisfied with instruction in regard to only the most obvious and simple points, and accordingly the new primers are of a more advanced character as regards matter and extent; the treatment, however, remains such that they can be easily understood by any one without a previous knowledge of electricity.

This volume contains eighteen primers in all, the last one being a review or "Primer of Primers," which sums up the salient features of the different topics treated. The subjects of the different primers relate to the various sources and phenomena of static and current electricity and of magnetism, with practical deductions and applications. Atmospheric electricity and the phenomena of the earth's magnetism receive a particularly interesting treatment, and the primers on the electro-magnet, electro-receptive devices, and frictional and influence machines are very practical in their scope.

While the work is primarily intended for popular reading, the care of statement and logical development of principles make it a valuable work for electricians who wish to gain a knowledge of or to review the principles upon which the science is based.

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* *Original Papers on Dynamo Machinery and Allied Subjects.* By John Hopkinson, M. A. D., Sc., F. R. S. New York: The W. J. Johnston Co., Ltd., 1893. 249 pages, 98 illustrations. Price $1.00.

† *Electricity and Magnetism:* Being a Series of Advanced Primers. By Prof. Edwin J. Houston. New York: The W. J. Johnston Co., Ltd. Cloth. 306 pages, 116 illustrations. Price $1.00.

XUM

RECENT MILITARY ARTICLES OF SPECIAL INTEREST.

Journal of the U. S. Cavalry Association, December, 1892.

"Captain Crawford's Last Expedition." By Lieut. W. E. Shipp, 10th Cavalry.

"Cavalry upon the Field of Battle." By Lieut.-Col. Prejentsoff. Translated by Lieut. Geo. E. Read, 5th Cavalry.

"The Sabre." By Lieut. E. P. Andrus, 5th Cavalry.

"Conversations on Cavalry." By Prince Hohenlohe. Translated by Lieut. Carl Reichman, 9th Infantry.

"The 'Trot' as a Cavalry Gait." By Captain S. L. Woodward, 10th Cavalry.

Journal of the U. S. Artillery, January, 1893.

"Our Artillery Organization." By Colonel John Hamilton, U. S. A.

"A Few Thoughts on Practical Artillery." By Lieut. G. N. Whistler, 5th Artillery.

"Target Practice." By Lieut. H. C. Davis, 3d Artillery.

"A New Percussion Fuse." By Henry P. Merriam.

"Field Artillery Draft." By Lieut. A. D. Schenck, 2d Artillery.

"Some Applications of Glennon's Velocity and Pressure Formulas." By Captain James M. Ingalls, 1st Artillery.

"The Artillery Fire Game." Translated by Lieut. J. P. Wisser, 1st Artillery. (An excellent number.)

The United Service. (Hamersely.)

"The Renaissance of War." By Captain Edward Field, 4th Artillery.

The North American Review.

"Needed Reforms in the Army." By General John Gibbon, U. S. A.

Aldershot Military Society, December 6, 1892.

"Modern Infantry Fire Tactics." By Colonel H. M. Bengough, C. B.

Journal of the Royal United Service Institution, January.

"Notes on Infantry Tactics." By Lieut.-Gen. Sir W. J. Williams, K. C. B., R. A.

"Cavalry Divisions and Divisional Cavalry." By "A General of Cavalry."

Journal of the United Service Institution of India.

"The Bearing of Recent Developments in the Means of Destruction on the Medical Services in Time of War." By Surgeon-Captain F. P. Nichols, M. S. October, No., 1892.

"The Training of Cavalry for Reconnaisance." By Captain H. L. Pilkington, 21st Hussars. October and Nov., 1892.

"Instructions for the Field Firing of Detachments of the Three Arms of the Russian Army." Translated by Captain R. C. Andrews, Indian Staff Corps.

The United Service Magazine, London.

"Studies in Troop Leading." By Major G. F. R. Henderson, December, 1892, January, 1893.

"Mo'tke's Military Works." By Captain F. Maude, January, 1893.

"Notes on the Three Arms." By C. L. H., January and February, 1893.

Revue Militaire de L'Etranger, January, 1893.

Observations Tactiques du General Dragomirov sur les Manœuvres et Exercices des Troupes de son Commandement.

ARTICLES ACCEPTED FOR THE JOURNAL.

Military Misconceptions and Absurdities, By CAPT. JAS. CHESTER, 3d U. S. Artillery.
Drill, By CAPT. C. J. CRANE, 24th U. S. Infantry.
Flags of Truce, By CAPT. G. S. CARPENTER, 14th U. S. Infantry.
Apprentice Schools for the Army, By CAPT. G. HOWARD, Q. M. Dept.
Remarks upon European Armies, By CAPT. J. J. O'CONNELL, 1st U. S. Infantry.
The Post Mess, By CAPT. M. C. FOOTE, 9th U. S. Infantry.
The Knapsack and Army Shoe, By CAPT. W. E. DOUGHERTY, 1st U. S. Infantry.
Extended Order and Skirmish Firing, By LIEUT. W. W. BLOW, 15th U. S. Infantry.

Military Service Institution of the United States.

WASHINGTON, D. C., JANUARY 6, 1893.

To the Members of the Military Service Institution of the United States.

GENTLEMEN:

In submitting, on behalf of the Executive Council, the annual report of the Institution for the year 1892, it is again a pleasure to be able to show steady progress in all its affairs.

The Treasurer reports the balance on hand on the 1st day of January, 1892, as $5417.88, of which $500 was invested in a bond.

The receipts during 1892 were $9131.01. The expenditures $8097.78. Balance on hand, January, 1, 1893 (including $500 in bond), $6451.11. The surplus of receipts over expenditures for the year is $1033.23.

Four hundred and eighty-two new members have joined the Institution during the year, showing a most gratifying appreciation of the value of the JOURNAL.

The library has received a large number of valuable books, and three handsome book-cases, from General JAMES B. FRY, for which he is entitled to the thanks of the Institution.

An acknowledgment is due to the two officers who constitute the immediate working force of the Institution. The marked increase in membership, resulting largely from the efforts of the Secretary, the excellent state of the finances as shown by the Treasurer's reports, and the high character of the JOURNAL under the editorship of Major WILLIAM L. HASKIN, 1st Artillery and 1st Lieutenant JAMES C. BUSH, 5th Artillery, evince the faithfulness with which they have advanced the interests of the Institution and the ability and industry with which they have performed the duties intrusted to them by the Council.

Very respectfully,

J. M. SCHOFIELD,

President.

Announcements.

I.

AT a General Meeting of the Military Service Institution held at Governor's Island, N. Y., on the 11th day of January, 1893, the biennial election for President and six members of the Executive Council of the Institution took place.

The ballots received were duly canvassed and the following officers were found to have been elected:

President.

Major-General JOHN M. SCHOFIELD, U. S. A.

Members of Executive Council.

(Term ending 1899.)

Major CLIFTON COMLY, Ordnance Dep't.
Captain H. P. KINGSBURY, 6th U. S. Cavalry.
Colonel E. S. OTIS, 20th U. S. Infantry.
Colonel CHARLES PAGE, Medical Dep't.
General C. H. TOMPKINS, Q. M. Dep't.
General A. S. WEBB, (late) U. S. A.

II.

At a meeting of the Executive Council of the Military Service Institution held on the 11th day of January, 1893, the several reports of the members of the Board of Award on the Prize Essay for 1892 were read, and it was found that the essay signed "Ab adaptatione vis" was decided to be entitled to the prize, and the essays signed "Noli me tangere," "Semper paratus," "Vol. reg." and "Reserve," to honorable mention.

Upon opening the accompanying envelopes the Prize Essayist was found to be 1st Lieutenant Sidney E. Stuart, Ordnance Dep't. U. S. A.

The essays entitled to honorable mention were written by Captain E. L. Zalinski, 5th U. S. Artillery; Major Wm. Cary

Sanger, recently of the National Guard, State of New York; 1st Lieutenant John T. Thompson, Ordnance Dep't. U. S. A.; and 1st Lieutenant R. D. Walsh, 4th U. S. Cavalry.

III.

At a meeting of the Executive Council held on the 25th day of January, 1893, the following named officers were unanimously re-elected for the term of two years ending in January, 1895.

Vice-Presidents.

Major-General O. O. HOWARD, U. S. A.
Bvt. Brig.-General T. F. RODENBOUGH, U. S. A.

Secretary.

Major W. L. HASKIN, 1st U. S. Artillery.

Treasurer.

1st Lieutenant J. C. BUSH, 5th U. S. Artillery.

Assistant Secretary and Vice-Treasurer.

Captain GUY HOWARD, Q. M. Department, U. S. A.

XUM

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XUM

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Prize Essay—1893.

I.—The following Resolution of Council is published for the information of all concerned:

Resolved, That a Prize of a Gold Medal of suitable value, together with a Certificate of Life Membership, be offered annually by THE MILITARY SERVICE INSTITUTION OF THE UNITED STATES for the best essay on a military topic of current interest; the subject to be selected by the Executive Council and the Prize awarded under the following conditions:

1. Competition to be open to all persons eligible to membership.*

2. Each competitor shall send three copies of his Essay in a sealed envelope to the Secretary *on or before September* 1, 1893. The Essay must be strictly anonymous, but the author shall adopt some *nom de plume* and sign the same to the Essay, followed by a figure corresponding with the number of pages of MS.; a sealed envelope bearing the *nom de plume* on the outside, and enclosing full name and address, should accompany the Essay. This envelope to be opened in the presence of the Council after the decision of the Board of Award has been received.

3. The prize shall be awarded upon the recommendation of a Board consisting of three suitable persons chosen by the Executive Council, who will be requested to designate *the Essay deemed worthy of the prize;* and also in their order of merit those deserving of honorable mention.

4. The successful Essay shall be published in the Journal of the Institution, and the Essays deemed worthy of honorable mention shall be read before the Institution, or published, at the discretion of the Council.

5. Essays must not exceed twenty thousand words, or fifty pages of the size and style of the JOURNAL (exclusive of tables).

II.—The Subject selected by the Council at a meeting held Nov. 11, 1892, for the Prize Essay of 1893, is

"*THE NICARAGUA CANAL IN ITS MILITARY ASPECTS.*"

III.—The gentlemen chosen by the Council to constitute the Board of Awards for the year 1893 are:—

BRIGADIER-GENERAL THOMAS H. RUGER, U. S. A.,
BREVET-COL. A. C. M. PENNINGTON, U. S. A.,
CAPTAIN G. W. DAVIS, 14TH U. S. INFANTRY.

WM. L. HASKIN,
Secretary.

GOVERNOR'S ISLAND,
January 1, 1893.

* "All officers of the Army and Professors at the Military Academy shall be entitled to membership, *without ballot*, upon payment of the entrance fee. Ex-officers of the Regular Army of good standing and honorable record shall be eligible to full membership of the Institution *by ballot* of the Executive Council.

"Officers of the United States Navy or Marine Corps shall be entitled to membership of the Institution *without ballot*, upon payment of the entrance fee, but shall not be entitled to vote, nor be eligible to office.

"All persons not mentioned in the preceding sections, of honorable record and good standing, shall be eligible to Associate Membership *by a confirmative vote* of two-thirds of the members of the Executive Council present at any meeting. Associate Members shall be entitled to all the benefits of the Institution, including a share in its public discussions, but no Associate Member shall be entitled to vote or be eligible to office."

XUM

GOLD MEDAL, PARIS, 1878.

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Historical Sketches of the Army.

THE following named officers have volunteered, or have been designated to prepare Historical Sketches of their Corps or Regiments for publication in this JOURNAL.

*Adjt. General's Dept.....GEN. J. B. FRY.
Quartermaster's Dept....GEN. S. B. HOLABIRD.
*Subsistence Dept.....GEN. J. W. BARRIGER.
Medical Department.....SURGEON CHAS. SMART.
*Pay Department.....COL. A. B. CAREY.
*Signal Corps.....LIEUT. WM. A. GLASSFORD.
1st Cavalry. .....CAPT. R. P. P. WAINWRIGHT.
*2d Cavalry.....MAJOR A. E. BATES and CAPT. E. J. MCCLERNAND.
3d Cavalry.... ....LIEUT. THOS. B. DUGAN.
*5th Cavalry.....LIEUT. EBEN SWIFT.
6th Cavalry.... .....CAPT. WM. H. CARTER.
7th Cavalry.....CAPT. E. A. GARLINGTON.
*8th Cavalry.....CAPT. C. M. O'CONNOR.
9th Cavalry.....LIEUT. GROTE HUTCHESON.
*10th Cavalry.....LIEUT. JOHN BIGELOW, JR.
1st Artillery..... ..... COLONEL L. L. LANGDON.
2d Artillery.....LIEUT. W. A. SIMPSON.
*3d Artillery.....LIEUT. W. E. BIRKHIMER.
*4th Artillery.....LIEUT. A. B. DYER.
2d Infantry.....GEN. FRANK WHEATON.
3d Infantry..... .....CAPT. WM. GERLACH.
4th Infantry.....LIEUT. JAS. A. LEYDEN.
6th Infantry. .....LIEUT. CHAS. BYRNE.
7th Infantry. .....LIEUT. A. B. JOHNSON.
8th Infantry..... .....LIEUT. W. P. RICHARDSON.
9th Infantry.....CAPT. E. B. ROBERTSON.
*10th Infantry.....LIEUT. S. Y. SEYBURN.
*11th Infantry..... ..MAJOR J. H. PATTERSON and CAPT. R. C. J. IRVINE.
12th Infantry.....LIEUT. CHAS. W. ABBOT, JR.
13th Infantry.... .....LIEUT. M. J. O'BRIEN.
*14th Infantry.....COLONEL T. M. ANDERSON.
*15th Infantry.....CAPT. H. R. BRINKERHOFF.
16th Infantry.....CAPT. WM. V. RICHARDS.
17th Infantry.....CAPT. GEORGE RUHLEN, A. Q. M.
*18th Infantry.....LIEUT. C. H. CABANISS, JR.
*19th Infantry..... ...CAPT. C. C. HEWITT.
20th Infantry..... ....CAPT. J. N. COE.
*21st Infantry.....CAPT. FRED. H. E. EBSTEIN.
*22d Infantry.....CAPT. O. M. SMITH, C. S.
24th Infantry..... ...LIEUT. H. W. HOVEY.
*25th Infantry. .....CAPT. GEORGE ANDREWS.

* Published in JOURNAL.

THE THIRD UNITED STATES ARTILLERY.

By LIEUT. WM. E. BIRKHIMER, Adjutant 3d U. S. Artillery.

I. ORGANIZATION.

THE history of the Third United States Artillery dates from the reorganization of the army pursuant to Act of Congress, March 2, 1821. This act reduced the military establishment, and fixed the line at four regiments of artillery and seven of infantry. It marks an important epoch in the history of the army.

It is true that, prior to this, there had periodically existed in the United States army a third regiment of artillery. There was one during the Revolution; it was organized originally in 1775 by Colonel Richard Gridley, of Massachusetts, a half-pay British officer, the command soon passing to Henry Knox and finally to John Crane. Although numbered third it was in fact the oldest of the four continental artillery regiments. It began its career before and lasted longer than any other. Crane ranked all the other artillery colonels and, when the artillery was consolidated in 1783, he was given command by General Washington. Excepting one company, the revolutionary artillery was soon after disbanded.

The reorganizing Act of March 16, 1802, provided for one regiment of artillerists. The Act of January 11, 1812, authorized two regiments of artillery. The primary object was to utilize these regiments as sea-coast defenders; a light artillery regiment, to move with armies in the field, having been authorized, for a limited time, by the Act of April 12, 1808. The three sea-coast regiments were, in so far as promotions and other details of service were concerned, kept as distinct as though they had belonged to three different arms; nevertheless, officially, they were designated the first, second and third regiments of artillery. Alexander Macomb, afterwards General-in-chief of the army, was colonel of the Third Regiment, which enjoyed a brief, though highly distinguished career, serving, like its revolutionary predecessor, from first to last in the face of the enemy. But the heavy artillery, in the War of 1812, principally did duty as infantry, taking its place in the works on the sea-coast or in line of battle on the field, as occasion demanded. Pursuant to Act March 30, 1814, this arm was reorganized into a so-called corps, and here the new Third Artillery disappeared.

It thus will be seen that, if the hiatuses from 1783 to 1812, and from 1814 to 1821 be bridged, the Third Artillery legally may trace its history to 1775, when the Colonial army first confronted the British at Boston. The regiment does not, however, claim the right to do this. It does not seek thus to span two such periods in an hypothetical existence. But should the halcyon days come in which the War Department sanctions uniting the prehistoric with the present, the regiment's genealogical tree will be found planted near the source of the stream.

XUM

The army had been reduced in 1815, after the war with Great Britain, to 10,000 men, and the Act of 1821 still further reduced it to 5600 enlisted. The reorganization consequent upon the latter reduction was based upon no well considered military principle. Alleged economic reasons alone prompted the measure. The new artillery, however, had some features worthy of notice. The Ordnance Department—previously a corps of mechanics—was now merged in that arm, and a supernumerary captain attached to each artillery regiment also, assisted by detailed artillery lieutenants, was to perform ordnance duty. It was further provided that one company in each artillery regiment should be designated and equipped as light artillery. Although the language of the law was mandatory, this feature long remained a dead letter on the statute-book. The companies so designated continued to carry muskets and serve as infantry or sea-coast artillery for many years; their only distinction being some slight differences of uniform, and the fact that their field-music consisted of bugles instead of the fife and drum. In later years, under the able and enlightened administration of Secretary of War Poinsett, this provision of the law was given effect, and, as the event has proved, to the imperishable glory not only of the artillery but of the army.

Prior to the reorganization of 1821 the artillery embraced the light regiment and the corps; the former of 10 companies, the latter of 32 arranged to 8 equal battalions, in all 42 companies—3860 enlisted men. The four new artillery regiments numbered 36 companies—9 each—a total reduction of 6 companies, but of 1872 enlisted men—nearly 50 per cent. Before this reduction there were in the artillery 1 colonel, 10 other field, and 190 company officers—or 1 officer to 19.2 men; afterwards, 4 colonels, 8 other field, and 190 company officers, or 1 officer to 10.1 men. Here, for the first time, the skeleton regular peace establishment plan—many officers and few men, to expand in time of war—was put in operation; a veritable military *ignis fatuus* which, as to the regular army, in practice, has never materialized.

After the reduction of 1815 the 8 artillery-corps battalions—4 companies to each—were arranged with strict impartiality to the geographical military divisions. In each division the artillery companies were lettered from A to Q inclusive, excluding J; 4 companies, numbered from 1 to 4 inclusive, constituting a battalion. The companies of the disbanded artillery organizations which were arranged to form the present Third Artillery pursuant to the Act of 1821 were as follows:

Letters of 3d.	Former designation.	Letters of 3d.	Former designation.
A	E 3d Battalion Northern Division.	F	E 1st Battalion Southern Division.
B	B 2d Battalion Southern Division.	G	P 2d Battalion Southern Division.
C	F 3d Battalion Northern Division.	H	F Light Artillery.
D	K 2d Battalion Southern Division.	I	O 2d Battalion Southern Division.
E	I Lt. Art. and Q 1st. Bat. So. Div.		

The staff embraced 1 colonel, lieutenant-colonel, major, adjutant, sergeant-major and quartermaster-sergeant each, the adjutant being a company officer. This organization remained intact until the Act of April 5, 1832 took away the supernumerary captain for ordnance duty, while organizing

the Ordnance Department anew, although artillery lieutenants continued to be detailable under the Act of 1821 for duty therein.

There was here perpetuated in the artillery, as a permanent part of its organization, a feature that always did and always will prove a curse, namely, giving each company a double-row of both first and second lieutenants. This as to first lieutenants has remained unchanged, as to second lieutenants it now is simply authorized. No army is wisely organized which does not, by the ordinary casualties of service, furnish the officers a reasonable chance of promotion. The corps as organized in 1814 had the same fault. In both cases it was expected that the extra lieutenants would be available for ordnance or other kindred duties directly in the line of the artilleryman. The trouble was and has continued to be that, when the ordnance department was reorganized in 1832 and 1838, these extra lieutenants were not placed therein and cut off from the regimental organizations.

It was a fundamental error to unite the light and heavy artillery as was done in 1821. The duties of these two branches of the arm are so dissimilar that, to be most efficiently performed, their organizations must be radically different.

It would naturally result that, in a regiment with three field officers to nine companies, and four lieutenants to each captain, promotion, unless stimulated by a bloody war or sickly season, would soon come to a standstill. For a time after 1821 stagnation in promotion was even worse in the lower branches of the artillery than it is now. In greater or less degree the same stagnation affected the other arms of service, but not to the same extent as the artillery. To such a pitch did the evil attain that in January, 1836, sixty-nine graduates were attached to the army as brevet second lieutenants. Plainly the supply was greater than the demand. As a natural result of this state of affairs again, officers began to turn from a profession which furnished so little hope of advancement. During the same year 117 officers resigned, and seven others, including a lieutenant-colonel, declined commissions. Among those who left the Third Artillery at this time was Lieutenant George G. Meade, the future victor at Gettysburg.

This extraordinary exodus of the best young officers in service attracted the serious attention of Congress. It was seen that the attempt to maintain a cheap army, when all avenues to promotion were practically closed to officers of subordinate grades, was a failure. So-called economy had overreached itself. About this time the Florida war was precipitated and for years dragged its slow length along amidst miasmic swamps more fatal than the weapons of the concealed and savage foe. Regimental officers were all required in the field, where death by the enemy's bullet or sickness greatly and rapidly depleted their numbers. The occasion was considered propitious for a general rectification all along the line! this was particularly the case with the staff, which then, as since, found the hey-day of their happiness when the regiments were fighting the enemy in the field, and which staff, by Act of July 5, 1838, was very largely augmented. The artillery was at the same time increased by one company—K—in each regiment, while the number of privates per company was temporarily increased by 16, bringing the number up to 58, and the number of company second lieutenants reduced to

one, the surplus officers being absorbed gradually either in the new staff or in their regiments. But in truth the great number of resignations, together with the Florida war, had so reduced the army that there were very few to be thus absorbed. The increase of 16 men per company was only for the Florida war, which virtually terminated in 1842, when, by Act of August 23d, that year, the number of privates was reduced to the same number, and the artificers to one less per company, than fixed by the Act of March 2, 1821.

The Mexican War, soon after precipitated, wrought a very considerable, and, contrary to expectation at the time, permanent change in the organization of the artillery. The expansive idea for the regular army was now attempted to be acted upon, and the President, by Act May 13, 1846, was authorized to increase the number of privates to 100 in each company and at discretion reduce it again to 64; the Act February 11, 1847, added a second major and a quartermaster, the Act March 3, 1847, gave two principal musicians and one principal teamster to each regiment, two teamsters to each company, two additional companies to each artillery regiment, authorized the equipping another company in each as light artillery, and gave all the latter mounted pay. These acts were therefore important for the artillery. All this was not without reason; and the immediate reason was the approved fighting qualities of the artillery on the Rio Grande and in Mexico. The country wanted more troops of that kind. The increase was, however, intended to be temporary only, except the additional two companies. The extra majors were wanted for recruiting duty. The regimental quartermaster, and the teamsters, regimental and company, were authorized upon the recommendation of the Quartermaster-General, after reports by General Taylor of the inefficiency of that department in the field. The quartermaster, not being an extra officer, was not affected by the clause providing for disbandment after the war; the majors were retained permanently, and the principal musicians temporarily, by Act July 19, 1848, but the teamsters disappeared with the war.

The only other act, prior to the Civil War, affecting the artillery, was that of June 17, 1850, which fixed the number of privates in a light company at 64, but authorized the President to increase the number of privates in any company under certain circumstances, to 74 at the expense of other companies.

The organization of the Third Artillery, like that of all the four old regiments, remained unchanged until after the War of the Rebellion, when by Act of July 28, 1866, it was given, with slight modification, the same organization as the Fifth Artillery, organized by Act July 29, 1861. The effect was to increase the number of majors by one, to make the adjutant, the quartermaster and commissary extra lieutenants, increase the regimental non-commissioned staff by 1 commissary sergeant, 2 principal musicians and 1 hospital steward, and the battery by 1 sergeant, 4 corporals and a number of privates to raise the whole number to not exceed 122 at the discretion of the President, who was also authorized to add to each battery 1 first and 1 second lieutenant, 2 sergeants and 4 corporals—battery being the new legal designation for the old company. The Act of March 3, 1869, added a chief musician, while that of

July 15, 1870, abolished the grade of regimental commissary sergeant and hospital steward, and reduced the number of corporals per battery to four. Under the operation of these laws, therefore, the maximum organization of a regiment of artillery at this time is: 1 colonel, 1 lieut-colonel, 3 majors, 1 adjutant, 1 quartermaster and commissary, 1 sergeant-major, 1 quartermaster-sergeant, 1 chief musician, 2 principal musicians, and 12 batteries, each battery 1 captain, 2 first and 2 second lieutenants, 1st sergeant, 1 quartermaster-sergeant, 8 sergeants, 4 corporals, 2 musicians, 2 artificers, 1 wagoner, and not to exceed 122 privates. Such remains the organization of the artillery regiments to-day. The vicious feature is the retention of 4 lieutenants to 1 captain. This is simply annihilation to the ambition of younger officers, who in consequence labor under disadvantages which do not, to anything like an equal degree, affect any other part of the army.

The Fifth was organized as a light artillery regiment. But its organization was a mistake, if it was to be maintained after peace, as, though the act authorizing it did not so contemplate, was actually the case. From 1821 and before then, this excessive number of subaltern artillery officers relatively to others, has proved detrimental in the matter of promotion; and yet no other branch of service, tested by the demands of actual warfare, has furnished a greater number of distinguished commanders.

II. PERSONNEL.

The officers arranged to the Third Artillery in 1821, were a distinguished body of men. Colonel W. K. Armistead, a soldier of twenty years service, was transferred from the position of chief of Engineers to make way for Macomb, razeed from brigadier. The other field officers, Mitchell and Bankhead, were veterans of the War of 1812; the former soon resigned, serving afterwards in Congress; the latter, as colonel of the Second Artillery, lived to distinguish himself again in the war with Mexico.

Of the captains, Roger Jones, Samuel B. Archer and Felix Ansart had been brevetted for gallant conduct in battle. The former was afterwards for many years Adjutant-General, and Archer Inspector-General of the army. Captain Henry Knox Craig became chief of ordnance, while 1st Lieutenant John A. Dix, the distinguished Union general, and 2d Lieutenant Samuel Ringgold, who subsequently commanded and fought with the first company of horse artillery equipped in the United States Army, were among the subalterns.

It would be an interesting and grateful task to trace the honorable careers of officers whose names from time to time have graced the rolls of the Third Artillery. Space, however, will permit us here to recall but a few. The oldest living graduate, Mr. Wm. C. Young of New York City, whose labors have done so much to develop the railroad system of the country, was a 2d lieutenant in 1823; George S. Greene, the gallant old soldier who, though threescore years of age, left the position of chief engineer Croton Water Works, when the Civil War broke out, and served with highest honors as colonel and general officer, joined the Third Artillery as lieutenant in 1823; Robert P. Parrott, so well and favorably known to the world through his invaluable services to the Union cause by a new system of ordnance, was a lieutenant from 1824

to 1836; so also from 1825 to 1832, was Benjamin Huger, subsequently a major-general in the Confederate service; Albert E. Church, the honored West Point Professor of Mathematics, served from 1828 to 1838; Robert Anderson, the hero of Ft. Sumter, was an officer of the regiment for thirty-two years, from 1825 to 1857; Erasmus D. Keyes, afterwards a major-general of volunteers, from 1832 to 1858; George G. Meade from his entry into service until he resigned as before mentioned. Thomas W. Sherman continuously from 1836 to 1861, and again from 1863 to 1870 as colonel; Braxton Bragg, afterwards lieutenant-general in the Confederate service, from 1837 to 1856; William T. Sherman from 1840 to 1850; Stewart Van Vliet from 1840 to 1847; Jubal A. Early, the Confederate lieutenant-general, from 1837 until he resigned; George H. Thomas from 1840 to 1855; John F. Reynolds, who was killed while commanding his corps on the first day at Gettysburg, from 1841 to 1861; E. O. C. Ord from 1839 to 1861; Samuel G. Field, afterwards a Confederate major-general, from 1843 to 1848; A. E. Burnside from 1847 to 1853; Romeyn B. Ayres from 1847 to 1861, and as lieutenant-colonel from 1870 to 1879; Beekman Du Barry, subsequently commissary general, from 1850 to 1861; Henry J. Hunt, the distinguished chief of artillery, Army of the Potomac, was lieutenant-colonel of the regiment from 1863 to 1869, and George W. Getty colonel from 1870 to 1883; besides many others, whose services with the regiment, though rendered in less conspicuous stations, have, as hereafter will more fully appear, been none the less faithful or honorable. The Army Register for 1866, the first issued after the close of the Civil War, sets forth the proud record of the Third Artillery. The lieutenant-general, 2 major-, and 1 brigadier-generals of the 17 general officers of the fighting part of the army—nearly one-fourth—served their novitiate and received their first practical lessons in the military art in the commissioned ranks of the regiment. Moreover, not one of these generals was a mere political appointment. Not one of them was made a general officer for what he was expected to do, but for what he had done.

III. SERVICES.

From 1821 to 1827 the Third Artillery occupied the central Atlantic stations from Annapolis, Md., to Charleston, S. C. This was a season of quiet. The arm was not, however, professionally inactive. In 1824 "the artillery corps of instruction" was established at Fortress Monroe, Va.,—the forerunner of the present school there—and maintained until broken up by the demands of the Florida War for troops.

In 1827 the stations of the Third were changed to the New England coast, headquarters, Ft. Independence, Massachusetts. Existence was tranquil, duties merely routine. The early thirties, however, brought more excitement. In 1831, B, E, H, took station at Fortress Monroe, whence, next year, B and H were sent to Charleston, S. C., to put down the nullificationists; proceeding thence to the disturbed Seminole and Creek Indian districts of Florida and Alabama. When the Florida War broke out C and I were also in the hostile country. This was precipitated by a tragic event—familiarly known as Dade's massacre. On December 28, 1835, Brevet Major and Captain Francis L. Dade, 4th Infantry, with one company of the Second

and B of the Third, was ambushed near the crossing of the Withlacoochee River, Florida, and all but 4 privates killed, one of whom belonged to B. Captain Upton S. Fraser, 2d Lieut. R. R. Mudge, Brevet 2d Lieut. John L. Keais, and thirty-one enlisted men of the Third fell on the field.

Upon receipt of this intelligence, the steps of the whole regiment were at once bent towards the theatre of hostilities—where A, D, E, F, G arrived in June, 1836. Meanwhile the companies in Florida were actively engaged. On December 31, 1835, C, H were with General Clinch when he defeated the Seminoles near Withlacoochee ford. On March 29, 1836, C, H, I, part of the force under General Clinch, were again engaged near the Withlacoochee. The same companies met the Indians again on June 9 and 19, 1836, the former near Macinope, the latter between that place and Ft. Drane. Later in the year, A, C, H, I encountered the Indians at Ft. Drane, August 21st; on the Withlacoochee River, October 13th; and in the Wahoo swamp, on November 21, 1836. At this time the other companies of the regiment, except B, were in Alabama assisting to overawe the Creeks. B, after its annihilation, was reorganized in Massachusetts, and joined the regiment in the field in January, 1837, being engaged with the enemy at Camp Munroe, Fla., February 8th, following.

During 1837 all the companies were actively employed against the enemy, driving them from one fastness to another, yet rarely seeing them. The service was distressing beyond description. It was almost impossible to bring the Indians to bay except they wished it. Besides, the bullets of a concealed savage foe were less destructive to life than the reptiles abounding and diseases contracted under a vertical sun in the almost boundless and impenetrable swamps. The year 1837 was the season of General Jesup's advent upon the theatre of operations. It were tedious and unprofitable to follow the companies of the Third in all their wanderings through the everglades. Suffice it to say they were constantly on the move, drawing tighter the cordon about the Indians who gradually were being made prisoners or exterminated. All the companies were in the field, traversing the hostile district in every direction. In May, 1837, C was mounted, and with B, 4th Artillery, performed the duty of scouts until the 12th of the following December when the horses were turned in.

The termination of this year was signalized by an event of great interest to the regiment. For the first time since its organization all the companies were united; they were mustered together December 31, 1837, at Fort Christmas, Florida.

The next day the regiment, under Lieut.-Colonel Gates, marched, in Brevet Brigadier Eustis' brigade, against the hostiles, who were defeated, January 24th, at the Locheehatchie. The Indians were now coming in rapidly. But the Cherokees, in the northern part of Georgia, were now to be removed west of the Mississippi, and troops were needed to start them. Accordingly, in April, 1838, A, F, H, I, under Lieut.-Colonel Gates, followed, May 7th, by D, C, E, G, under Brevet Major McClintock, 4th Artillery, and later by B, marched across the peninsula from Fort Jupiter to Tampa Bay, and proceeded via New Orleans and Tuscumbia, Ala., to Chattanooga, Tenn., where the regiment was again, and, so far as known, for

the last time united; for, although K was authorized at this time, it was not yet organized. Here the Third remained, camped on the sites of subsequent famous battle-fields, until the Cherokees started west, when it returned, piecemeal, via Augusta, Georgia, to the theatre of active operations in Florida. On November 19, 1838, C was broken up, the men transferred to other companies, and the lieutenants ordered to Carlisle, Pa., where the company, as will hereafter be narrated, was being reorganized as horse-artillery. To keep up the equilibrium in Florida, however, K, the newly authorized company, joined December 24, 1838.

During the remaining years of the Florida War, 1839, '40, '41, '42, there was no relaxation in the arduous nature of the services required of the regiment, which was scattered all over the northern part of the peninsula, building roads and posts, following and skirmishing with the Indians. The latter, while ordinarily small affairs, judged by casualties alone, were generally brought about only after great suffering on the part of the troops, to whom the innumerable annoying and venomous insects of the swamps rendered existence intolerable. To fight the Indian was a relief, for it had at least the charm of excitement. But they had learned by dear experience that they were no match for the whites in the long run, and therefore avoided the latter except when fortuitous circumstances gave them every advantage. Nevertheless, the Third had frequent passages at arms with them in the campaign of 1839 under Brevt. Brigadier-General Z. Taylor; again on July 26, at New River inlet, November 1, on the Picolata road, December 3–24 in the Everglades, all in 1840; and at the latter place, January 7, 1841. The campaign of 1840, carried on through the tropical heat of summer, was particularly trying.

The war may be said to have ended August, 1842. The Indians, originally 7000 strong, excepting 300, 95 of whom were warriors, were killed or expelled, and those excepted were compelled to live within certain prescribed limits. Eleven officers of the Third died in Florida during that war; of these three fell in action, and one died of wounds; 45 enlisted-men were killed by the Indians, and 113 died of disease. Nearly every officer of the Third was in the field. Ten were brevetted for gallantry in specific actions.

The war being over, the Third, in 1842, occupied the stations from Smithville, N. C., to St. Augustine, Fla., where it remained until the Mexican War.

The re-organizing act of March 2, 1821, provided, as before mentioned, that in each regiment of artillery, one company should be designated and equipped as light artillery. In 1838 the initiatory steps were taken to carry this provision into effect. Brevt. Major Samuel Ringgold, captain 3d Artillery, was selected by Secretary Poinsett for this work. Hitherto the great objection to carrying the law into execution was the attendant expense. But now a number of horses rendered surplus, after some of the southern Indians had been removed, were available for the purpose of mounting C company as horse artillery in which rôle it served until after the Mexican War. Companies of the other artillery regiments were also soon afterwards mounted, but as field artillery. In Ringgold's company the drivers were armed with the sabre; all other enlisted men with sabre and pistol. In the field companies, the mounted men were armed in the same way, but the can-

noneers each with musketoon and artillery sabre, which must have proved extremely inconvenient.

The Mexican War soon brought every officer of the Third into the field again. As during the Florida War, headquarters moved into the enemy's country. The action of the Congress and President of the United States in 1845, regarding the annexation of Texas, precipitated hostilities. A, C, E, I, with other troops, were sent that year to Corpus Christi, Texas, forming General Z. Taylor's army of occupation.

A, C, I, were present when the opening gun of the war was fired at Palo Alto, May 8, 1846. Ringgold, while skillfully fighting his guns, was mortally wounded by a cannon-shot, dying on the 10th of the same month. He was one of the most accomplished officers of the regiment, and the *beau-ideal* horse artilleryman. The command of C then devolved upon 1st Lieutenant Randolph Ridgely who retained it until after the capture of Monterey. A and I formed part of the artillery foot-battalion both at Palo Alto and the next day at Resaca de la Palma. Lieut. Churchill of the Third commanded two heavy 18-pounder guns from this time until after the army crossed the Rio Grande. In his report of the battle of Palo Alto General Taylor states: "Our artillery, consisting of two 18-pounders and two light batteries (C, Third, A, Second) was the arm chiefly engaged, and to the excellent manner in which it was manœuvred and served is our success mainly due." E during this time was at Ft. Brown forming part of the garrison which, for 160 hours stood off and finally repulsed an overwhelming besieging force. Shortly afterwards it was mounted as light artillery, Braxton Bragg commanding, with George H. Thomas and John F. Reynolds as assistants. What a trio that was! the first the victor at Chickamauga; the second at Nashville; the third the incomparable commander of the first Army Corps who fell in the fore-front at Gettysburg!

Under the Act of May 13, 1846, authorizing 100 privates per company, many companies in the field were broken up, the men transferred, and an officer sent home to recruit. This happened to I, July 7, 1846, whose captain, Martin Burke, was dispatched to North Carolina to reorganize the company, which he did and then rejoined the army at Perote on General Scott's line of operations. The place of I in the foot-battalion was filled by B which arrived at Mier, Mexico, July 31, 1846, officered by Capt. Vinton, Lieuts. Van Vliet, Joseph Stewart and Francis J. Thomas.

In the movement on Monterey, A and B were part of the foot-artillery battalion, 1st Brigade, Worth's Division; C, marching with the dragoons, formed part of the 3d Brigade, Twiggs' Division. In the attack upon that place, as is well known, the army was divided. Worth, making a detour to his right attacked from the west: Twiggs, Butler and Quitman from the east. Both C and E moved with Twiggs' column. The gallantry of these two light companies was never surpassed. Impression upon the substantial earth-works and heavily built houses of the town they could make little; but whenever the enemy showed themselves in the open they were at once assailed by the light artillery in such manner as to cause them soon to seek shelter. The part taken by A and B, while not so brilliant, contributed however in no less degree to the success of our arms. They formed part

of the storming column sent against Lomade Federacion ; Captain John R. Vinton commanding the artillery battalion, Van Vliet, B., and Lt. Francis Taylor, A. The brave fighting of the troops was conspicuous, and was continued the next day, September 22, when the Bishop's Palace was taken, and thence from house to house into the centre of the city, which then capitulated.

Soon after this event both Worth and Twiggs' regular, and Butler's and Quitman's volunteer commands joined General Scott's army destined to the southern line of operations, Vera Cruz—City of Mexico. C and E alone of the Third were left to General Taylor, their commanders having been meanwhile changed. Ridgely was accidentally killed October 27, 1846, at Monterey, and Bragg was, November 7th, transferred to C ; Capt. Thomas W. Sherman, who, promoted May 28, 1846, to E, had been arbitrarily kept out of its command by General Taylor, now was assigned to his proper position, joining his company February 14, 1847, just in time to take part in the fighting at Buena Vista.

The American army being thus divided, and Taylor left with only about 4000 men, Santa Anna, whether by instinct or accident, determined to act upon the correct military principle and beat the widely separated parts in detail. Hence resulted the battle of Buena Vista, which shed an unfading lustre on the American arms. On our left, the volunteers at first fled ingloriously. The torrent of defeat was stemmed by the light artillery, O'Brien of the 4th Artillery losing his pieces, his horses being killed and the infantry supports gone. This was the supreme moment. Santa Anna launched his reserves on our centre, at first with irresistible force. Everything gave back before the enemy's masses. But E was there, and, although compelled to recede, did so only by the recoil of its splendidly served guns. Bragg, with C, had gone to the left to assist righting matters; but, seeing the movement against the centre, hurried as fast as his jaded horses could travel to meet it. What followed is best described in the language of General Taylor's report: "Captain Bragg, who had just arrived from the left, was ordered into battery. Without infantry to support him, and at the imminent risk of losing his guns, he came rapidly into action, the Mexican lines being but a few yards from the muzzles of his pieces. The first discharge of canister caused the enemy to hesitate, the second and third drove him back in disorder and saved the day." Bragg stated that he expended 250 rounds of ammunition per gun that day. In his official report General Wool stated that, "without our artillery, we could not have maintained our position a single hour."

There has always been an amiable tradition in the army since Buena Vista that General Taylor, when Bragg came up at the interesting moment above referred to, remarked "A little more grape, Captain Bragg." This has been echoed in popular histories of the war, until the incident has obtained general credence. Now the *spirit* of the supposititious occurrence is above criticism ; it has the true ring of the battle-field. Artillerymen have, therefore, permitted it to pass unchallenged, not knowing but that it might have occurred, and not wishing to spoil a good story ; at the same time, as they knew very well that Bragg carried no grape in his ammunition chests,

they doubted its truth, yet with a conscious look of commiseration, patronizingly put the whole thing down as doubtless the not unnatural mistake of an infantry general. Fair play, however, demands that this reflection on old "Rough and Ready's" technical knowledge be removed. Bragg himself has furnished the evidence that the incident, as narrated, never transpired. Afterwards when he was lieutenant general, his attention was called to it, and he said that he remembered the circumstance perfectly; but that General Taylor, far from wasting any time on imaginary grape, called out in clarion tones, "Captain, give them hell." The transition was doubtless made by some one more piously than truthfully inclined. We tender, as seems fitting in this year of jubilee and "historical sketches" this the *amende honorable* to our infantry brethren, craving pardon for having given countenance to an insinuation, which we all felt was probably unjust, against the accuracy of the professional language of one of the best and truest soldiers they have ever produced; one under whom every artilleryman loved and was proud to serve; one whose indomitable will and honesty of character triumphed over every obstacle, turning, as at Buena Vista, seeming disaster into glorious victory!

One more word aside: When the Mexican reserves pierced our lines just before Bragg "saved the day" there fell, gallantly fighting at the head of his regiment, Col. William R. McKee of the 2d Kentucky. An educated soldier, his was an exalted and noble spirit! A fitting sire of that other accomplished officer, Major George W. McKee, whose death the army and a host of devoted friends recently have been called upon to mourn. Stricken down in the prime of intellectual vigor, in Major McKee the army saw pass away one of its brightest ornaments and most useful members, one upon whom nature had showered her choicest gifts; possessed at once of every attribute which renders man respected, admired, beloved.

We will now follow the companies of the Third on other theatres of operation. Before General Scott left the Losbos Islands he had designated H as a mounted company. It served as such during the war, commanded first by Captain Wall and then by Steptoe. A, B and G arrived at Vera Cruz in time to take part in the siege, March 9-28, 1847, being joined April 11, by K. Colonel Gates with headquarters were, with D, temporarily established at Tampico, an important port of entry, and the capital of a district held under military government with Gates as governor. D remained at Tampico and vicinity during the whole war, being equipped part of the time as horse artillery. F, in which W. T. Sherman was a subaltern, was at Monterey, Upper California. I was being recruited, and L and M not yet organized.

At Vera Cruz Captain John R. Vinton was killed in the trenches by one of the first shots from the enemy. It was one of those singular cases in which death results from the close proximity of a projectile in its flight. His clothes were not even disarranged. The projectile, afterwards recovered unexploded, now rests upon his grave at Providence, R. I. It was a Paixhan shell, and, when the fuse was drawn, was found to contain 320 leaden bullets. In the death of Captain Vinton the Third lost another of its most valuable officers.

XUM

In organizing the army for the advance upon the City of Mexico A, B, G, K, formed a battalion under command of Lieut-Col. Belton, 3d Artillery, in the 1st (Garland's) brigade, Worth's division, and here the battalion remained during the war, except, that, at Perote, A was stopped, and I, under Captain Burke took its place. In the advance H was assigned to Patterson's volunteer division, and it served with the volunteers until the army left Mexico.

Vera Cruz was an affair wholly of engineering and siege artillery. The next battle, at Cerro Gordo, was one, on our side, almost wholly of infantry. Unfortunately, moreover, Worth's division, which had done most of the work at Vera Cruz, did not get into position at Cerro Gordo until there was little for it to do. By one of those accidents which sometimes happens, Worth, while going into action, was halted to permit Pillow to file in front of him into position on the extreme left. As a result, when Worth reached the Cerro Gordo hill, he found the enemy already fleeing from it, and could therefore only join in the unsatisfactory duty of facilitating that flight. H, however, was more fortunate. The armament of the company consisted of four 12-pdr. brass guns and two 24-pdr. howitzers. The battle was fought on the 18th of April 1847. During the night of the 17th, Steptoe and Lt. H. Brown, 3d Artillery, after immense toil, in which they were assisted by the infantry, placed the two 24-pdr. howitzers on the hill Atalaya 900 yards from the Cerro Gordo, the stronghold of the Mexicans, and from which next day, during the assault, they were served with great effect upon the enemy. For his conduct here Steptoe was brevetted major.

From this time on the Third took part in all the battles except Contreras on Scott's line of operations. That battle was fought by Twiggs' division. There was no fighting of consequence after Cerro Gordo until the American army was within sight of the Capital. The army advanced from Puebla August 7, 1847. B, G, I, K, formed the foot battalion of the Third. Captain Wall of H was left sick at Puebla, where, August 13th he died, and the company then was commanded by Steptoe, being attached to Quitman's volunteer division. The officers present were: Lt. Col. Belton, commanding battalion; B, Lieuts. Farry and Lendrum; G, Capt. Anderson, Lieut. Shields; I, Capt. Burke, Lieut. Ayres; K, Lieut. R. W. Johnston; Light Company H, Capt. Steptoe, Lieuts. Judd, H. Brown, Francis J. Thoms, and Welch. Brevet Major R. D. A. Wade was also present, sick, not commanding his company, K, but acting as field officer.

While Twiggs' division was assaulting the enemy's lines at Contreras, August 20, 1847, Worth's division, on the right, moved against Cherubusco and the fortified village of San Antonio. Here the Third, particularly K, in its advance as a forlorn hope against the latter place, had an opportunity to render conspicuous service. San Antonio being taken, K remained temporarily to garrison it, while the other companies pressed on to assail and capture Cherubusco. Seven men of the Third were killed, and Lieut.-Colonel Belton and twenty-seven men wounded. H was not in the battle; it was back in San Augustine with Quitman, protecting the supply depots, and the army from attack in rear by the enemy's cavalry.

The fruitless armistice which followed this event having been terminated, the battle of Molino del Rey was fought September 8, 1847. Here the brave Farry and Ayres fell. Farry, with fifty men of the Third joined the storming party directed against the fortified centre of the Mexican position at the Casa Mata. The attack was successful, but 12 of the 14 officers of the party fell in the assault. The battalion of the Third entered el Molino on the right of our line, and here, while gallantly leading his men, Lt. Ayres was killed, while Captain Anderson and Lieut. George P. Andrews were wounded. H was not present. The battle was fought by Worth's division, to which it was not attached.

Chepultepec alone remained to be fought. Molino was preparatory thereto. At Chepultepec all the Third with the army were engaged. H was placed on September 11th on the right, to threaten an attack on the San Antonio and Candelaria gates of the city. It remained there constantly employed until the evening of the 13th when it rejoined Quitman who, in the general battle, had stormed the Belen gate, but without artillery support, could not advance further against the fire from the Citadel 300 yards away. Steptoe, by greatest industry placed in a well constructed battery some heavier guns, but at dawn of day a white flag bespoke the enemy's surrender. H then moved in, being the first light company to enter the City of Mexico. Meanwhile, the foot-battalion had not been idle. Details were assisting to construct the batteries to play on the fortifications of Chepultepec. Lieut. R. W. Johnston with a party of the Third were told off to the storming party. The remnants of the Second and Third Artillery, under Lt. Col. Belton, were temporarily formed into 4 companies, Shields and Lendrum commanding those from the Third. They moved with Worth's division along the causeway, driving the enemy, until, at San Cosmo garita, night put an end to the conflict. Next morning Santa Anna had fled the Capital.

The war was practically ended. The light companies of the Third had a few brushes with the enemy besides those mentioned, but the heavy fighting has been narrated. And it was heavy fighting. The strength of the positions occupied by the enemy was remarkable. The nearest approximation in this century to the style of fighting our army there did was exhibited by Wellington's war against fortified places in the Spanish Peninsula. The City of Mexico was ours September 14, 1847. But before this, D, under Capt. F. O. Wyse had a most creditable affair at the Callabosa River. D at this time was equipped as horse artillery. A, equipped as field artillery, was present at Huamantla, October 9, 1847, at Atlixco, October 19th, and at Matamoras, near Puebla, November 23, 1847. These were among the last of Santa Anna's guerilla efforts. The light company—A— won high encomiums for its conduct.

The army evacuated the City of Mexico June 12, 1848, Worth's division being the last to leave. L and M saw no fighting in that war. They left New York City for the scene of hostilities October 12, 1847, were wrecked and put in to Charleston, S. C., November 5, left Fort Moultrie December 17, and arrived at the Mexican capital early in 1848, where also was established regimental headquarters. Colonel Gates remained Governor of Tam-

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pico, and Captain Martin Burke temporarily commanded the regiment. At this time the companies of the Third were distributed: A, Perote; B, G, H, I, K, L, M, City of Mexico; C, E, Walnut Springs near Monterey, Mex.; F in California; D, Tampico. C, D, were equipped as horse artillery; A, E, H, as field artillery; the rest marched as infantry.

The companies of the Third on Scott's line all left Vera Cruz July 16, 1848. The regiment, except C, E, F, was concentrated at Fortress Monroe, and thence distributed to the New England stations which it had left thirteen years before for the Florida War. E left Ft. Brown, Texas, October 26, 1848, for Fort Trumbull, Connecticut. C, under Lt. Judd, marched via Chihuahua to Santa Fé, N. M., where the guns were soon stored, and the company, equipped as cavalry, served two years against the Indians, eventually joining Bragg, with the few men whose terms of service had not expired, at Jefferson Barracks, Missouri, in 1850. F still held the fort at Monterey, California.

Soon the Seminoles who had been left in Florida became restive. Accordingly in September, 1849, B, under Geo. H. Thomas; D, under Wyse; H, Steptoe; L, under Austine, embarked for Palatka, Fla., near the scene of disturbance. Here they remained, marching through the swamps, until order was restored, when they returned to their stations in 1850.

The regiment now looked forward to the enjoyment for a time at least of a quiet life. But this hope was short-lived. In the nature of things it could not long be indulged. We had acquired a vast and unsettled territory by conquest; it was inhabited by savages or semi-savages. The army was needed to keep them in subjection.

Before narrating, however, the part acted by the Third in this field of duty, it will be best hurriedly to glance at the experiences of the light companies from the close of the Mexican until the breaking out of the War of the Rebellion in 1861. During this time the light artillery was the sport of the War Department. On the plea of retrenchment, the number of light artillery companies in the army was reduced to four, including C, Third, in September, 1848. April, 1849, four additional companies were authorized; but, in the Third, instead of E, B was selected and ordered to West Point, where Shover, its captain, was instructor of artillery. Captain T. W. Sherman had again to fight for his rights. But he triumphed; the order was modified, and E, not B, was mounted. The termination of this controversy was supposed, at the time, to establish the legal principle "once a light company, always a light company"; for the contention then was, and the War Department apparently conceded the point, that when the President had designated two companies in each artillery regiment as light artillery, under the Acts of March 2, 1821, and March 3, 1847, he thereby fixed their legal status as that of light companies until the law should be changed. This is not the place to argue regarding the correctness of the proposition; more recent practices have not been in accordance therewith. However, in 1851 E was dismounted again; in 1853, Congress having appropriated money expressly for the purpose, it was remounted, took station in Minnesota, where, excepting some expeditions over the Western Territories, it remained until 1861. C, after being remounted at Jefferson Barracks, 1850,

served at Forts Gibson and Washita, Indian Territory, where the expense of maintaining it was enormous, and where, as a school of instruction, it was almost valueless. In 1856 it was dismounted, and, with three others, one company each from the respective artillery regiments, stationed at Fortress Monroe, Va., to reëstablish the artillery school of practice; in 1858 it was remounted, ordered to Salt Lake to take over the light artillery armament which the Ordnance Department was masquerading with, and went thence in 1859 to Fort Vancouver, Washington Territory, where it remained until 1861.

In October, 1848, M, under Lieut. Geo. P. Andrews, sailed for California around the Horn, to join F. The movement of the regiment, though contemplated, was deferred. But our recently conquered subjects were restless, and had to be kept in order. With this object in view, B and L were sent early in April, 1853, to Texas, where they remained until early in 1854. This was for them a most fortunate circumstance, as they thus missed one of the direst calamities that has ever befallen our army on the seas.

How this was, we will now proceed to state. Pursuant to General Orders No. 2, H. Q. Army, September 26, 1853, Headquarters and the band with A, D, G, H, I, K, and large detachments of recruits for B and L, embarked December 21st, that year, for California, via Cape Horn, in the commodious steamer *San Francisco*. The vessel was new, its machinery excellent, and it was believed to be seaworthy. There were about 600 souls on board, including 500 belonging to or connected with the regiment. On the 22d the vessel was at sea. The 23d ended with a fresh breeze and cloudy weather. By that time the weather was very threatening. An ominous calm prevailed. At 9 P. M. that night the wind came up with terrific force out of the northwest. The sea rolled mountains high. The ship, spite of all efforts of her skillful and devoted crew, soon became unmanageable. By 1.30 A. M. of the 24th she was entirely at the mercy of the waves, her machinery being disabled, and sails blown away. At 9 A. M., 24th, a huge wave struck her, stripping everything from the upper deck, including the saloon, in which, in addition to the regular passengers, a large number of soldiers had taken refuge. It was estimated that 175 souls perished at this time, including about 150 soldiers and Major Washington, Captain Francis Taylor, Captain Field and Lieutenant Smith, together with Mrs. Taylor and Colonel Gates' son. Nothing could exceed the terror of the situation. Fortunately there were men on board who were fit to command. The officers of the vessel, and of the army, and Lieut. F. K. Murray of the Navy, set an example of heroism. The men, except a few dastardly souls, nobly seconded their efforts. To add to the horrors of the storm a leak was sprung, and only by intelligent, systematic, incessant and prolonged exertions was the vessel kept afloat. On the 25th the brig *Napoleon* was spoken but sailed away. The arrival of this vessel at Boston gave the authorities their first knowledge of the disaster. On the 26th, in latitude 38° 20′, longitude 69°, another vessel was sighted, but lost in the night. The men now began to die from exposure and exhaustion. On the 28th the bark *Kilby* of Boston stood by the wreck, and, the weather moderating on the 29th somewhat, ran a hawser and took off 108 passengers. That night the storm freshened, the haw-

ser parted, the *San Francisco* drifted out of sight, and the *Kilby*, after a vain search for 2½ days, sailed for New York. At 9.30 A. M., December 31st, the British ship *Three Bells* of Glasgow was spoken and lay to. The storm, however, was unabated. No communication, except by signals, could be had. On January 3, 1854, the *Three Bells* was joined by the *Antarctic* of Liverpool. On the 4th and 5th all survivors were tranferred to these two vessels. The *Antarctic* carried hers—142—to Liverpool. The *Three Bells* hers to New York. On January 12th the *Kilby* transferred most of her passengers to the Packet *Lucy Thompson*, bound to New York, making, herself, for Boston. Thus ended this appalling event. The ship was never seen or heard of more.

A Court of Inquiry, of which General Scott was President, was instituted to examine into the circumstances of this wreck, and as a result, whether justly or unjustly, Colonel Gates was relieved from command of the regiment which he did not resume until November, 1861.

Nothing daunted, the Third was soon again en route, this time by the Isthmus. April 5, 1854, headquarters with B and L, embarked at New York on the steamer *Illinois*, arriving, L at the Presidio, and B and headquarters at Benicia, California, May 5th following. The band, with D, G, I, K, were not so fortunate. They embarked on the steamer *Falcon*, and very nearly repeated the experience of the *San Francisco*. The vessel; though disabled in a storm, managed to make Hampton Roads, where the troops landed at Fortress Monroe. In May, 1854, the steamer *Illinois* picked them up, and they finally, after many tribulations, reached the California stations. H and A marched overland, via Salt Lake, Utah, where they wintered 1854-55, arriving, July 25, 1855, at Benicia.

From 1854 to 1861 the Third was actively employed in marching and scouting over the Pacific Coast throughout its length and breadth. There was not an Indian tribe from the Rockies to the Pacific Ocean whom they did not visit. They became veritable foot-cavalry. In this school some of the best soldiers of the War of the Rebellion were developed.

Scarcely had D landed at Benicia when it was sent on an expedition against the Indians of Pitt and McCloud rivers. L marched against the Umatillas, and both B and L, under command of Major G. R. Rains, 4th Infantry, against the Yakimas in October and November, 1855. During the same year D was engaged against the Klamath and M against the Puget Sound Indians. In the action at Hungry Hill, Oct. 31-Nov. 1, 1855, Lieut. H. G. Gibson, since colonel of the regiment, commanding D, was wounded. In the winter of 1855-56 the Rogue Rivers went on the war-path. B and H formed part of the command sent against them. E. O. C. Ord commanded the former, John F. Reynolds the latter. Ord attacked a party of hostiles at their village, Mackanootney, Oregon, March 26, 1856, routing them and burning their town. On April 28th, following, he met and defeated them again. Reynolds was fighting the same enemy elsewhere. In June, 1856, the Indians sued for peace. General Scott in orders from army headquarters complimented these officers and their commands for their gallant conduct in this war. In the same order the services of M under Keyes on Puget Sound, and L under Piper at the cascades of the Columbia were men-

tioned with commendation. It was at the latter affair that Lieut. P. H. Sheridan so distinguished himself. E also, under its indefatigable captain T. W. Sherman was doing good service. The Indians at the Yellow Medicine Agency began to manifest an ugly disposition. Sherman took their breath away by appearing among them with his battery, thus, in the language of the General Order before mentioned (14, H. Q. A., 1857) "by his promptness, judgment and firmness preserving the country from a war with the tribes of the Sioux nation."

The Pacific Slope Indians, having been severely punished all around in 1856, remained quiet during the next year. Not so, however, in 1858. May 17, that year, Steptoe, now a major 9th Infantry, was surprised by Indians at Tohotsnimme 40 miles north of Snake River on the road between the present towns of Almota and Colfax, Washington. The uprising was entirely unexpected, but the news spread, and the neighboring tribes flew to arms. Safety to the frontier settlements required the chastisement of the Indians. Accordingly an expedition was fitted out for this purpose under Colonel Wright, 9th Infantry. The Third composed the major part of the troops, and they were rapidly concentrated. A, from Yuma; B, Rogue River; D, San Diego; G. San Bernardino; K, Ft. Miller: M, the Presidio, were united at Fort Walla Walla. The Indians were vastly more numerous than the troops, but the latter were armed with rifle-muskets, just then issued to the army, the former with smooth-bores. The superiority of the rifle was at once strikingly manifest. The Indians, waiting until their smooth-bores were effective, found themselves mowed down by troops whom their own projectiles could not reach. They were signally defeated at Four Lakes, September 1, Spokane Plains September 5, and Spokane River, September 8, 1858. Nine hundred ponies were shot in one spot, on the Spokane River, which to this day is marked by their whitened bones. The principal chiefs were captured and hanged, and the tribes so humbled that they have never gone on the war-path since. In general orders from headquarters of the army, General Scott testified his appreciation of the services of the regiment in this campaign in most eulogistic terms.

The defeats of 1858 had the effect of keeping the Indians quiet in 1859. But the dispute over the boundary-line, and who should own San Juan Island seemed likely to precipitate war with Great Britain. Accordingly, August 8, 1859, A, B, D, G, left Ft. Vancouver and joined other troops at Camp Pickett on the southern, while the British troops occupied the northern end. In this position the forces of the two countries glared at each other for years; but as there was no fear of immediate hostilities after General Scott arranged for joint-occupation, the companies mentioned returned to Ft. Vancouver in December, 1859.

Early in 1860, Indian hostilities broke out in another quarter. A party of prospectors, headed by a Mr. Meredith, were massacred near Pyramid Lake, then in Utah, but now Nevada. Young Winnamucca was the leading spirit in this affair. An expedition was at once fitted out to punish the Indians involved. D, under Lieutenant Joseph Stewart, and a detachment of I, under Lieutenant H. G. Gibson, formed part of this force. The Indians were attacked and defeated near Truckee River, Carson Valley, June 2, 1860, several

soldiers and many Indians being killed and wounded. On July, 9, same year, A, B, M, left Ft. Vancouver, W. T., to scout through the Snake River country, returning in September. In August they met and routed the Indians at Harney Lake, Oregon. L, during the same year left Fort Umpqua to scout through the Klamath country, the theatre of the Modoc war of 1873, so often traversed by the Third during its tour on the Coast.

This practically ended the campaigning of the Third on the Pacific. Events soon called for its presence elsewhere. Meantime, to replace C, Co K, (Capt. Ord) left Ft. Vancouver, after the Spokane campaign of 1858, arriving at the Artillery School of Practice, January 1, 1859; and as, by War Department orders in 1858, two instead of one company from each artillery regiment were to be stationed there, F, then at Ft. Yuma, was sent to Fortress Monroe also arriving September 28, 1859. Here they remained, being only called out during the John Brown disturbance at Harper's Ferry, until they joined the army at Washington as light artillery in 1861. In August, 1860, J. F. Reynolds was appointed Commandant of Cadets, West Point, and, in October, Captain E. O. C. Ord transferred to light company C.

When the War of the Rebellion was precipitated, the Government was extremely anxious about the temper of the States on the Pacific Coast, particularly California. This led at once to energetic measures to secure the safety of San Francisco. All the companies of the Third on the Coast, except D, were at once concentrated in that harbor. Much, however, as they were needed there, they were needed in the east more. Accordingly, October 14, 1861, headquarters with H, G, L, M, and C, the horses and guns being turned in, embarked for New York via the Isthmus. This left A, B, I, at San Francisco and D at Ft. Vancouver, the latter proceeding in February, 1862, from Camp Pickett, San Juan Island, to Alcatraz Island, San Francisco Harbor.

Here B and D remained during the whole war. I came east in 1864 and was equipped as a light battery. A, similarly equipped, joined Colonel Carlton's column which marched in 1862 from California across the deserts to Tucson, Arizona, to secure that Territory from usurping rebel authority. This task having been successfully accomplished, it marched with other Union troops into New Mexico where it served as a light battery until 1865 when it was transported to Boston Harbor. While in New Mexico the light battery saw exceedingly hard service. It was marching much of the time, when not as artillery, against the Indians as cavalry. No company of the regiment saw harder service during the war than A. And it was of a nature precisely like that of horse company C, in the same section of country, from 1848 to 1850.

We now turn to the companies on the great theatre of war. E came in from Fort Ridgley, Minn., in May, 1861, and was present at Blackburn's Ford, July 18, and again at the first Bull Run July 21, 1861. Lieutenant L. Lorain was wounded at the former. The company was attached to W. T. Sherman's (1st) brigade of Tyler's (3d) division. In the battle of the 21st it attacked, with Sherman, at the centre; but as Bull Run was not there fordable, it had to content itself with engaging the enemy at long range. It assisted, with other batteries, to cover the retreat of the army. In

these engagements it lost several men killed and wounded. During the retreat the battery lost 3 caissons and its baggage wagons, these having been sent ahead, when the horses were cut out and ridden away by the cowardly fugitives fleeing from the battle-field.

Soon after this E started on an expedition to the South-Atlantic coast, and, as its services thereafter during the war were in a theatre distinct from the other companies of the regiment, they will be mentioned here. Its old and honored captain, T. W. Sherman, had been regularly promoted major, April 27, 1861, appointed Lieut.-Colonel of the new 5th Artillery May 14, and brigadier general of volunteers May 17, 1861. He was now to command the land forces of the joint expedition against Port Royal, South Carolina. From this time until January 1864, E served in the Department of the South, along the coast of South Carolina and Florida. It had six guns, and these were often divided up, a section (2 guns) going hither and thither in the petty warfare constantly carried on among the islands of the coast. It was engaged, June 10, 1862, at Secessionville, S. C., at Pocotaligo, Oct. 22, where hard fighting was done. In the latter affair Lieutenant Gittings was wounded. The battery was attached to the 2d brigade of Wright's (2d) division. It joined in the assault and repulse at Fort Wagner, S. C., July 18, 1863, under Myrick, and engaged in the siege of that place July 18th to September 7th, 1863. On February 20, 1864, it was present at the sanguinary battle at Olustee, Fla., in the army commanded by General Truman Seymour, and suffered great loss. All the officers, Capt. Hamilton, Lieut. Myrick, and two volunteers attached were wounded; 11 men were killed, 18 wounded and 6 missing—a loss as great as that of Senarmont's famous battery at Friedland. This terminated the services of E in the south. Pursuant to General Grant's plan to concentrate all the available forces to move against the Army of Northern Virginia, it left the Department of the South in April, 1864, under command of Lieut. J. P. Sanger, 1st Artillery, with the 10th Army Corps, and was assigned to duty with the Army of the James, being part of the artillery brigade of the 3d division. It was present at all the battles in which that "bottled up" army was engaged, on the 7, 16, 19, 20, April, 1864, afterwards in the intrenched lines at Bermuda Hundred, and on both sides of the James River, and in the works before Petersburg from August to September. Lt. Myrick was again commanding. It was present at Laurel Hill, Va., October 7, 1864, when the 10th Corps repelled Longstreet. It was present at both the attacks on Fort Fisher, North Carolina. After the successful issue of the second attack it marched with the army against Wilmington, N. C., having several skirmishes with the enemy. In March, 1865, E with the 10th Corps joined W. T. Sherman's army, engaging in the pursuit of J. E. Johnston, until the final surrender of the rebel armies.

When McClellan's army moved to the Peninsula in 1862, the other light batteries of the Third were attached to the artillery reserve. H, however, after being some time equipped as light artillery, was broken up just before the army started, and sent out to San Francisco under Captain Joseph Stewart to recruit. Captain John Edwards had transferred to M from B with George P. Andrews. This left C, E, F, G, K, L, M, on the Atlantic

Coast. The artillery reserve was, however, not a reserve as that term generally is understood. The idea was not to retain its batteries necessarily in the hands of its commander until their guns could be launched against the enemy at the supreme moment. It is true that they might be so used. But, aside from this use, it was expected that the reserve was to be a source of artillery supply whence the divisions could draw batteries for their needs, to be returned when this temporary service had been rendered.

From the first, consolidation of companies was necessary, because of the difficulties of recruiting for the regular army, and the demand for regular officers for other duties. The companies of the Third which marched with McClellan were (C-G) consolidated, equipped as horse-artillery, under H. G. Gibson, (F-K) under Capt. Livingston, and (L-M) under Capt. Edwards, the two latter consolidated companies as field artillery. (C-G) was soon detached with Stoneman's cavalry, and (L-M) with Sykes' brigade of regulars. The first was hotly engaged at Williamsburg, Va., May 4, 1862, 2d Lieut. W. De Wolf being mortally wounded, and the battery losing one piece, several caissons, and seventeen horses. When the army made the flank march from the Chickahominy to James River, (C-G) was cut off with Stoneman's command toward the old base of supplies at the White House, and, after its destruction, rejoined the army via Gloucester Point. (L-M) was engaged at Newbridge June 19, Mechanicsville June 26, and Gaines' Mill June 27, 1862. At Mechanicsville it was attached to Griffin's brigade, McCall's division, on the extreme left. At Gaines' Mill it was on the right, about 500 yards in front of the line, where it fought with great gallantry, and, it truthfully can be said, under great disadvantages; for at that early day, the necessity for concentrating artillery fire was not understood by subordinate infantry generals. Nevertheless, both our own and the enemy's general officers praised the conduct of the artillery on that day. (L-M) lost one section, Lieut. Hayden, its commander, being wounded, and the horses all killed. During the change of base to the James River (L-M) fought at Turkey Bend June 28-29, at Turkey Bridge June 30, and side by side with (F-K) at Malvern Hill June 30-July 1, 1862, during which all its lieutenants were wounded. At Malvern Hill the artillery acted a decisive part. The enemy attributed their repulse to our superiority in that arm. The Union artillery that day illustrated the truth of the maxim that artillery, under favorable circumstances, can defend itself against a frontal attack.

The Third was not present at the second Bull Run. When the army after that disaster moved into Maryland, (C-G) was with Pleasanton's cavalry, and (L-M) with the 9th Army Corps, though unattached. On the 13th and also at South Mountain on September 14th, the former rendered excellent service, as it did also at Antietam, where, with the other horse batteries, it filled the gap in the centre of the main line of battle between Hancock's division and Burnside's corps.

Soon after this, by War Department orders, G was formally broken up and the officers and men attached to C. For two years G remained a paper company only.

At Fredericksburg (December 11-15, 1862), C was attached to the Cavalry brigade, left grand division of the army. Livingston, captain (F-K), com-

manded the artillery 3d Corps, to the first division of which this battery (F-K), under Lieut. Turnbull was attached. When the Union army crossed the Rappahannock to the attack, it was stationed to cover the crossing, at the middle bridge. After the repulse of the right grand division it moved to the left and joined in the battle with its proper command; (L-M) crossed the river with General Sumner, but the jammed condition of the streets and character of the country prevented its coming into action.

In March, 1863. the 9th Corps was sent west, (L-M) accompanying it. The corps arrived at Vicksburg in season to take part in the siege of that place, and afterwards, July 10-16 in the siege of Jackson, Miss. From this time until March 16, 1864, (L-M) operated in the west. On May 24, that year, it again rejoined the Army of the Potomac. All this time it formed part of the artillery of the 9th Corps. It took part meanwhile in Burnside's campaign in east Tennessee, in 1863. It was engaged at Philadelphia, Tenn., October 16, Campbell Station, Tenn., November 16, was in position in the trenches during the siege of Knoxville, November 17-December 5, in pursuit of Longstreet's army at Blain's cross-roads, Tenn., December 17, 1863, and again at Strawberry Plains, Tenn., January 21, 1864. Its next fighting was in the Wilderness, under General Grant, from May 5th to 14th, 1864, whence it was sent back to the defences of Washington.

When Hooker made his march around the left flank of Lee's army, before the battle of Chancellorsville, C, under Lieut. Meinell, was left with the force which was intended to cross below Fredericksburg and hold the enemy in his works. It thus missed the battle. (F-K), under Turnbull, was more fortunate. On the 2d of May it rendered the Union cause most opportune service. It was still attached to the 1st division 3d Army Corps. When the 11th Corps was routed, a battery of 22 guns was hastily thrown together at Hazel Grove, on ground dominating the enemy's advance. (F-K) was of this battery, the fire from which, at short range, hurled back the victorious enemy discomfited. Of this struggle General H. J. Hunt, chief of artillery of the army remarked in his official report: "When the enemy, flushed with success, appeared before this battery, they were met with a storm of canister first checking and then driving them back from whence they had emerged at three hundred yards distance. It was a desperate combat between artillery and infantry, in which the former repulsed the latter, flushed as they were with a great success, which they were following up when checked by this battery."

At Gettysburg, July 1-3, 1863, (F-K) again acted a distinguished part, losing Lt. Manning Livingston and 8 enlisted men killed, 14 wounded, 1 missing and 45 horses killed. It was on the Emmittsburg road supporting Humphreys' division when Sickles' corps was attacked at Peach Orchard. This was about 3.30 P. M. July 2d. Here Captain D. R. Ransom while placing (F-K) in position was wounded. When Sickles' corps fell back, (F-K) was rescued with only the greatest difficulty. It was in the thickest of the fight when A. P. Hill took Birney's division in flank. Humphreys speaks in highest terms of the performance of the battery that day.

When Lee moved from in front of Hooker on the offensive campaign which terminated at Gettysburg, C was with Gregg's cavalry guarding the

Union right flank. It was in the engagements at Brandy Station June 8, Aldie June 17, Middleburg June 18-19, Upperville June 21st. Detached with General Huey's brigade it marched for York, Penn., in which general direction the rebel army seemed bent. It was upon this service when the battle of Gettysburg was fought. Being recalled, it arrived near the battle-field just in time to harrass the retreating enemy. In doing this it was engaged at Smithburg, Maryland, July 5; Williamsport, Md., July 6; Boonsborough, Md., July 8; Antietam and Funkstown, Md., July 10 and 11; near Port Royal, Va., September 1st; at Brandy Station, Culpepper and Rapidan River, September 12-14, at Madison Court-house and Robertson's ford September 22-23, 1863.

C was early in the field in 1864. It accompanied Kilpatrick in his raid to Richmond, being engaged at Mechanicsville, Va., March 1st, and stopped long enough in passing to throw 150 shells into the works guarding the enemy's capital. Soon after this (C-F-K), consolidated, became one battery, serving with the cavalry. Under Sheridan it was actively employed. It accompanied him in his raid on Richmond, May 9-24, 1864, passing the right of the enemy's army, defeating his cavalry, rejoining General Grant June 24, near Chesterfield, Va. During the flank march to the James River, the battery was engaged at Hanover Court House, May 31; Ashland, June 1, Bethesda Church, June 3, and in the works at the White House, June 20, 1864.

The next service of (C-F-K) was with Sheridan in the Shenandoah Valley. It was attached to the horse artillery brigade, commanded by Captain L. L. Livingston. Engaged near Winchester, August 11, on road to Front Royal, August 16, at Woolperth's cross-road and Sheperdstown, August 25, and Smithfield, August 29, 1864. The character of these affairs presaged the nature of the fighting that was to follow. Each commander, but particularly Early, seemed anxious to test the capacity and mettle of his opponent.

In the battle of Cedar Creek, October 19, 1864, (C-K-F) was present. After this it was engaged with others of Sheridan's troops in sweeping the Shenandoah Valley of the enemy, the engagement at Mount Jackson, Va., being the severest in which the battery took part. This practically closed the fighting of the battery during the war. That winter it went into quarters at Pleasant Valley, Maryland, and the next spring moved to the vicinity of Washington City.

When the 9th Army Corps came east in March, 1864, it was increased, before joining the Army of the Potomac, by several regiments and batteries, and among the others, G, equipped as field artillery. This battery accompanied the corps to the Wilderness where it partook in all the fighting of the latter until May 14. As is well known the country was not favorable for the manœuvre of light artillery, and consequently General Grant sent a large part back to the defences of Washington, and among others G. (L-M) arrived at the same time. Later they were joined by I. They remained in a condition of preparedness for active service; but, from this time on, except when Early made his attempt on Washington in July, 1864, nothing seriously demanding their attention occurred.

Thus it will be seen that B and D alone were not at some time equipped

as light artillery with the armies in the field. They remained at San Francisco harbor, where their services were deemed to be of more importance than they could be elsewhere. And when we reflect upon the absolute necessity that existed for preventing that city from falling into the enemy's possession, through their cruisers, it must be conceded that these companies best served their country as garrison artillery in the city's defences. D, as has been seen, was equipped as horse artillery during the Mexican War, so that B remains the only organization in the Third which at some time has not been equipped as light artillery.

Here terminates the "historical sketch" of the Third, for the pages of the JOURNAL OF THE MILITARY SERVICE INSTITUTION. It would be interesting to pursue the subject to later periods; yet subsequent events can scarcely be spoken of as "historical," but what is of determinative importance in the matter, we have already occupied to the full the limits permitted us in the JOURNAL'S pages. The Third Artillery stands on its record. It has ever done its whole duty. Neither the regiment nor any of its officers has ever intrigued to impose that duty on another.

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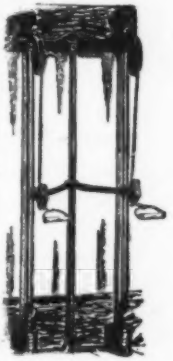
Yours very truly, W. L. SAVAGE.



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Gold Medal, Royal Agricultural Society, London, Eng., 1879.
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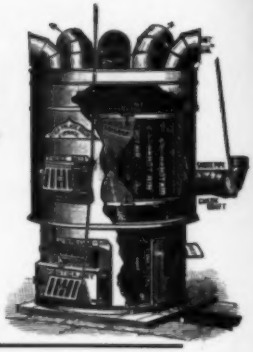

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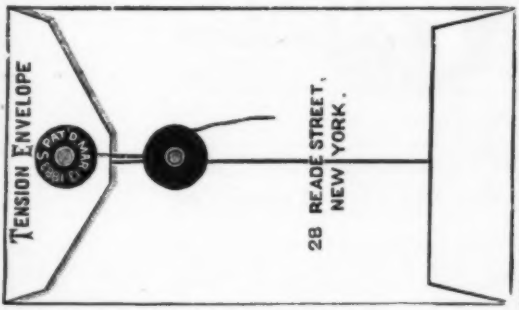

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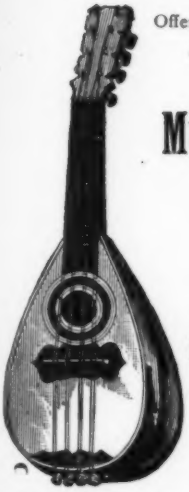

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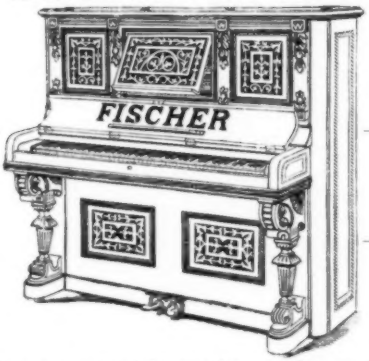

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